February 12, 1945

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

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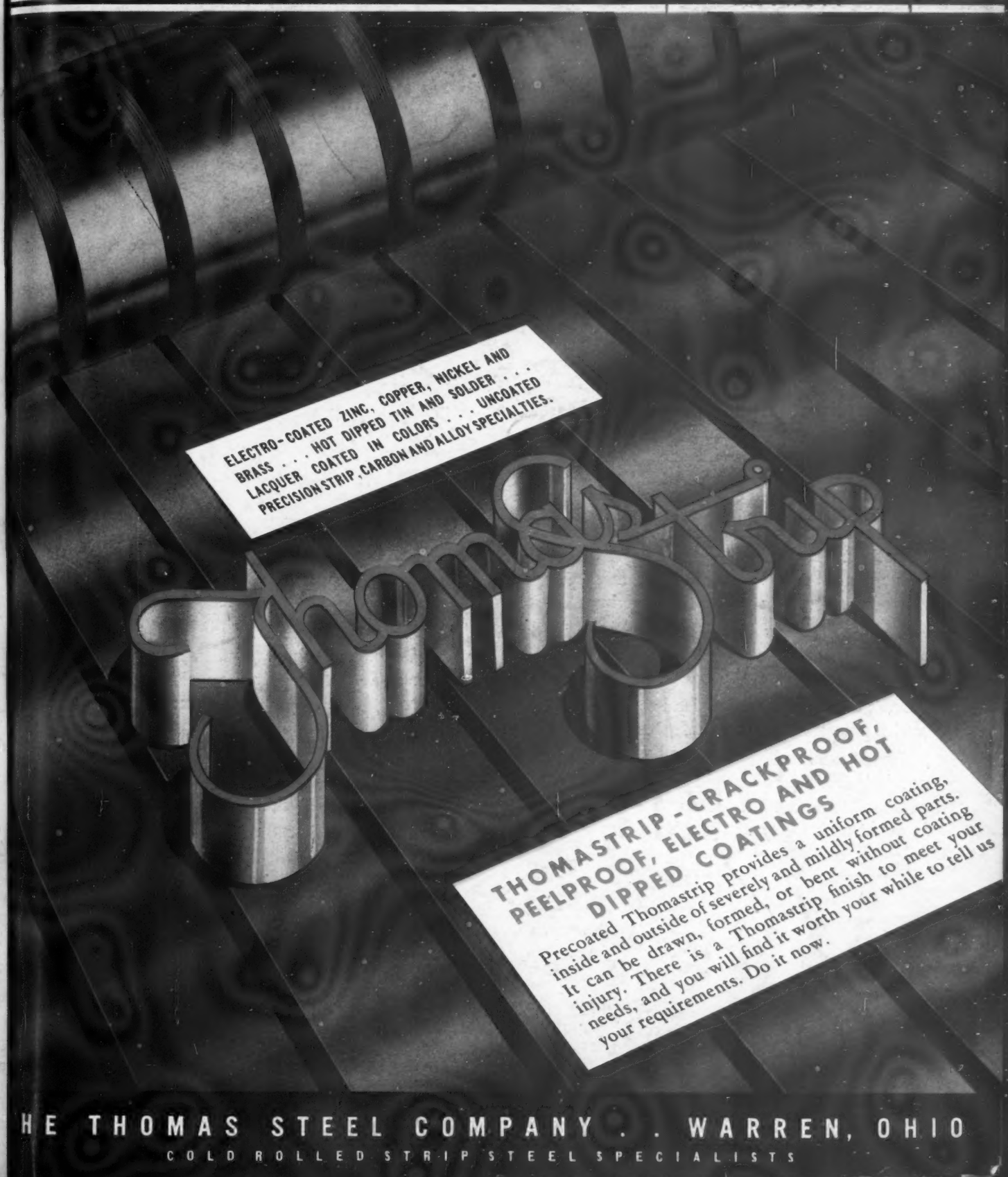
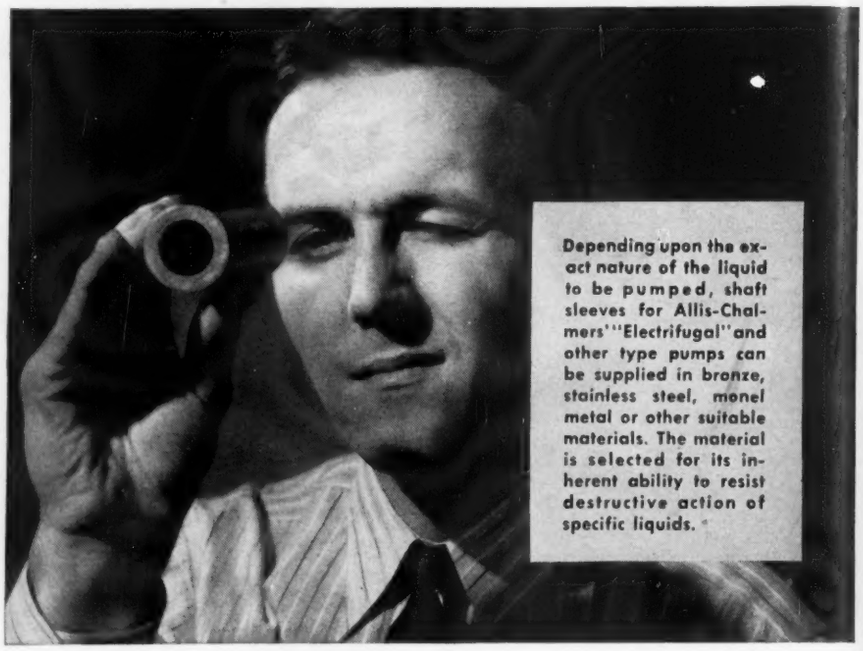

ELECTRO-COATED ZINC, COPPER, NICKEL AND BRASS . . . HOT DIPPED TIN AND SOLDER . . . LACQUER COATED IN COLORS . . . UNCOATED PRECISION STRIP, CARBON AND ALLOY SPECIALTIES.
Thomastrip
THOMASTRIP-CRACKPROOF, PEELPROOF, ELECTRO AND HOT DIPPED COATINGS
Precoated Thomastrip provides a uniform coating, inside and outside of severely and mildly formed parts. It can be drawn, formed, or bent without coating injury. There is a Thomastrip finish to meet your needs, and you will find it worth your while to tell us your requirements. Do it now.
HE THOMAS STEEL COMPANY . . WARREN, OHIO
COLD ROLLED STRIP STEEL SPECIALISTS

[PUMP TIPS FROM ALLIS-CHALMERS—ONE IN A SERIES]

How to make SLEEVES Last Longer . . .



Depending upon the exact nature of the liquid to be pumped, shaft sleeves for Allis-Chalmers' "Electrifugal" and other type pumps can be supplied in bronze, stainless steel, monel metal or other suitable materials. The material is selected for its inherent ability to resist destructive action of specific liquids.

AS WITH MANY pump troubles, excessive sleeve wear is apt to trace back to misalignment of pump and motor. For when shaft is deflected, sleeve is apt to wobble within the packing — accelerating friction and wear.

So serious is this problem of misalignment, that Allis-Chalmers engineers were led to develop, for many applications, the famous "Electrifugal" pump — in which both the motor and pump impeller are mounted on one shaft and in one frame.

In such a pump the elements cannot get out of line — and danger of excessive sleeve wear is minimized. However, many pumps in use today are separate from their driving motors — and the coupling flanges must be carefully aligned . . . and *kept* in alignment!

Here are other ways to extend sleeve life:

▶ Don't draw stuffing box gland too tightly . . . excessive pressure will wear shaft sleeves unduly.

▶ Never pump a liquid for which your pump was not designed. Sleeves are able to withstand corrosive effects of some but not necessarily all liquids. When in doubt over safety of changing pump application, check with your manufacturer.

▶ Generally a thin stream of liquid being pumped serves as a water seal between packing and sleeve. If it is dirty or abrasive, a separate supply of sealing liquid should be obtained. And it should reach the sleeve in a steady supply. Be careful water seal piping isn't plugged — or lantern ring displaced.

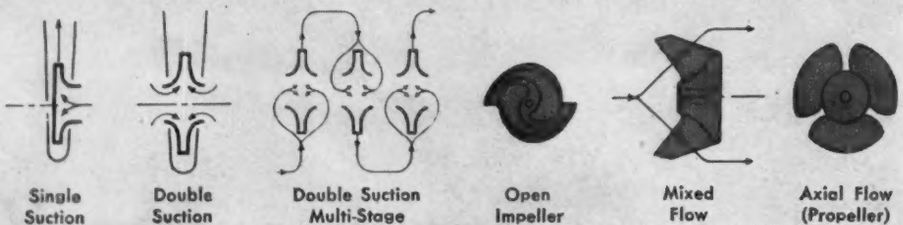
▶ Send for your *free* copy of Allis-Chalmers' "Handbook for Wartime Care of Centrifugal pumps". This valuable booklet applies to *all* makes of pumps. ALLIS-CHALMERS MFG. CO., MILWAUKEE 1, WIS.

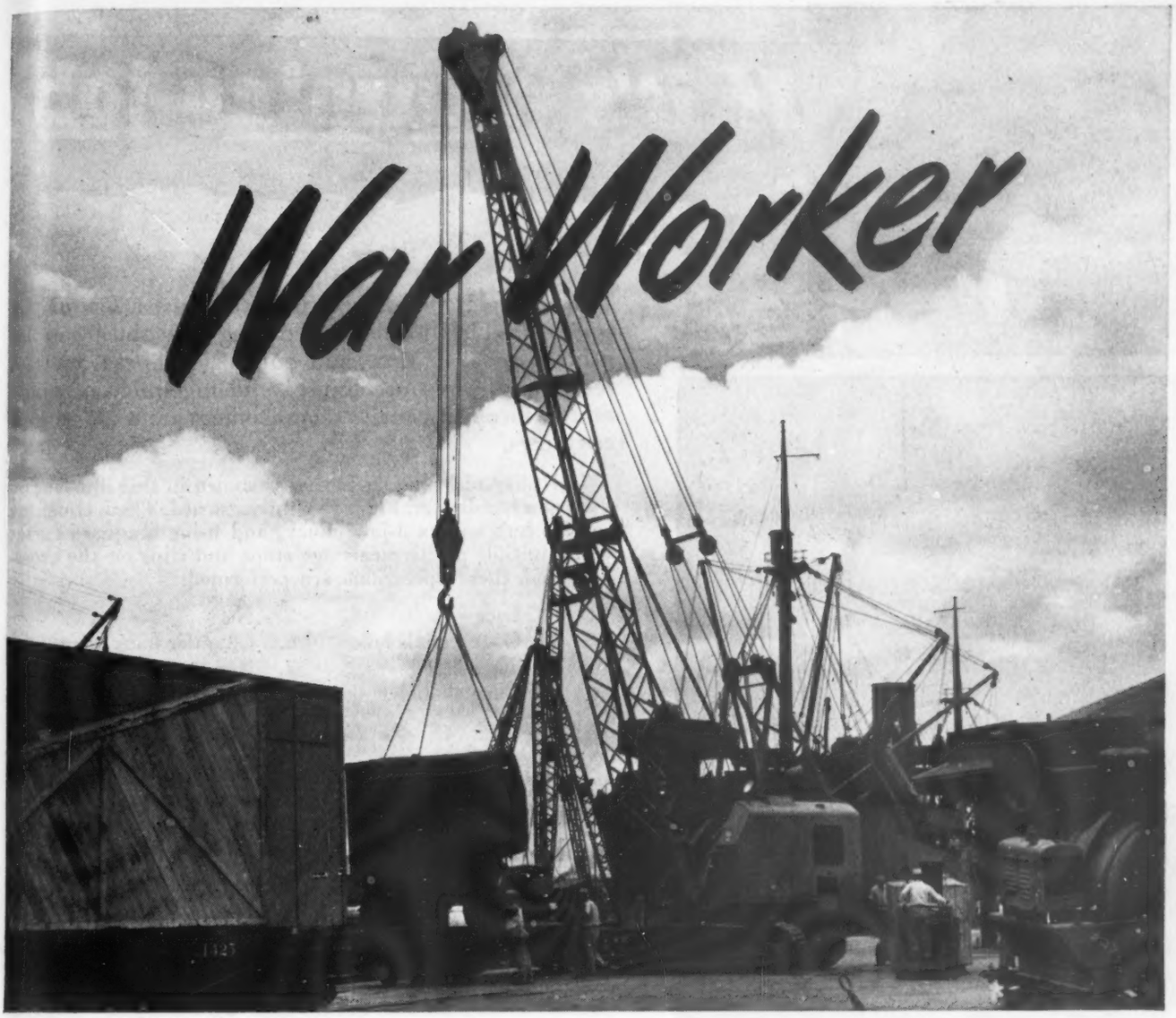
♪ *Tune in the Boston Symphony, Blue Network, every Sat. Eve.*

A 1708

ALLIS-CHALMERS PUMPS

Allis-Chalmers builds all types and variations of pumps shown at right. Capacities from 10 to 150,000 gpm—heads to 2500 lbs.





Not all war workers carry lunch pails and wear badges.

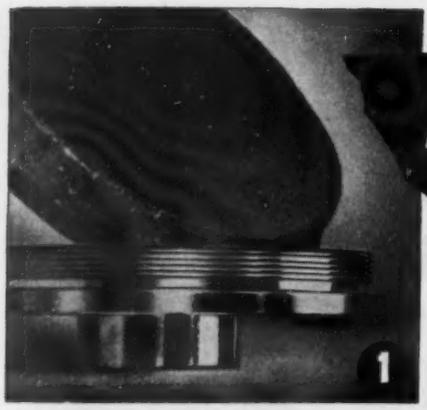
Plenty of them, like the crane in the picture, will never punch a time clock nor boss an assembly line. But they're war workers, just the same.

We're not going to say the obvious thing about Bethlehem Wire Rope, and the way it's helping so many vital machines to keep moving these days. We're simply going to mention that tons and tons of it are giving service all over the world, and that our people are working day and night at the factory, turning out still more Bethlehem Wire Rope for Government and civilian use.

We'd like to add, too, that Bethlehem rope has been handling some jobs that are 'way off the beaten path. (There's a landing-craft application that's a honey, but details can't be published till after the war.) All this experience is helping us accumulate facts that mean better wire rope. It's helping us make wire rope that will do old jobs better . . . new jobs efficiently.

Remember that, when you go to rerig your machines. Bethlehem has the background, the materials, the facilities, and the experience. All these ingredients, mixed together and cooked skillfully, mean good wire rope . . . as fine as the market affords. It will pay you to look for the Bethlehem trademark.

When you think WIRE ROPE
. . . think BETHLEHEM



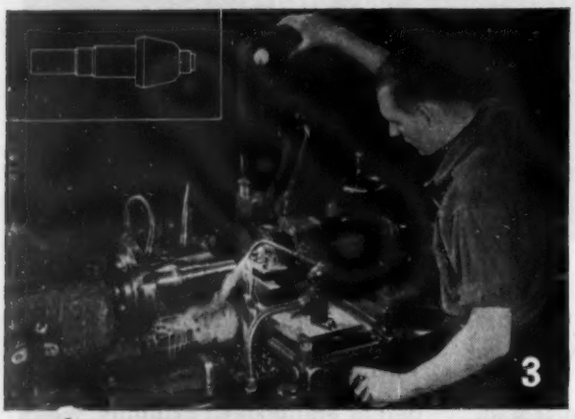
If it's a turning job

The examples shown here illustrate just a few of the ways in which Monarch Turning Machines can be utilized to save time and cut costs. These are the result of the resourcefulness and ingenuity of operators, foremen, plant management and Monarch engineers.

1 Utility of Monarch Lathes is shown in this illustration of a bomb plug. First, the hub is turned. Then, chucking on this hub with a 3-jaw chuck, and using a square turret with multiple positive carriage stops and clips on the cross-feed dial, these operations are performed:

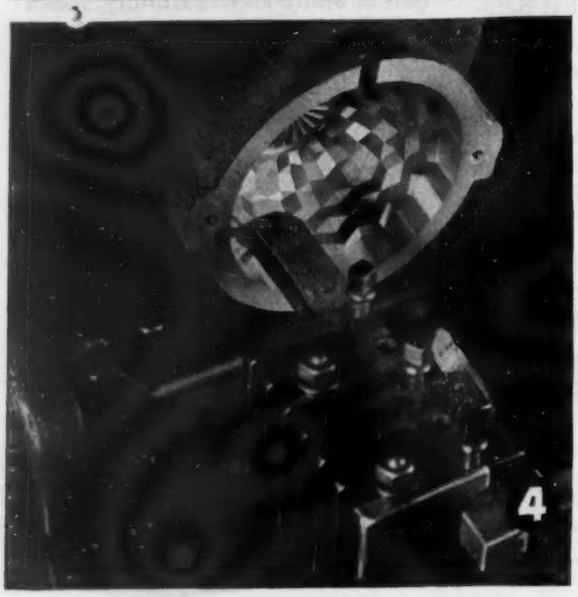
1. Face
2. Countersink hole
3. Turn OD
4. Turn shoulder
5. Neck
6. Chamfer back edge
7. Rough thread
8. Finish thread
9. Chamfer thread

Actual machining time—five minutes, 25 seconds.



2 Much time is saved by boring twelve holes in a double wall casting at one time. The jig is also made to swivel to line-bore a hole in the opposite plane. One Monarch Lathe will accommodate very wide varieties and sizes of work to be multiple-bored in jigs with special driving fixtures for driving the multiple-boring bars.

3 Truck bevel-pinion, 10¼″ long, being turned from a template, with diameters and tapers as indicated, on a Monarch Magnamatic. Set-up time with template and rear tools is only 15 minutes. One operator tends two machines, producing 32 pieces per hour.



4 Turning the shape and contour of a mold from a master cam and a thin metal template on a Monarch Shapemaster. With Monarch-Keller electric controls, the most intricate contours can be turned with speed and precision.

5 Spindle speeds of 5,000 rpm permit machining this aluminum housing in 38 seconds, floor to floor, on a Monarch 10″ Production Lathe, to a tolerance of .0003″. In 20 seconds, the operator turns OD flange, faces flange end, bores and chamfers inside and outside. The second operation takes 18 seconds to turn OD, face inside flange, face small end, groove, and chamfer small end. The high-speed precision operation of this new Monarch Lathe offers great cost-cutting possibilities.

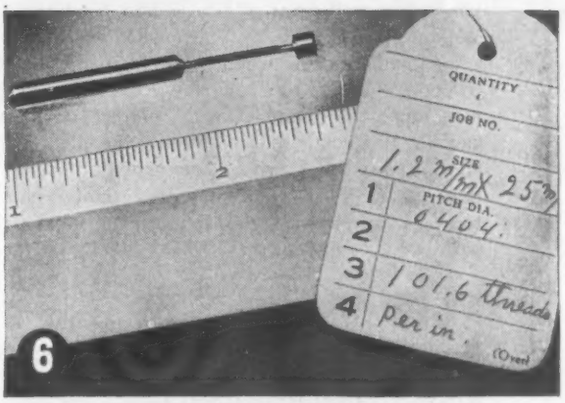
6 101.6 threads per inch, chased on a Monarch 10″ Precision Toolmaker's Lathe. Gear train carries special gears for 101.6 threads per inch. Lathe is equipped with

Monarch

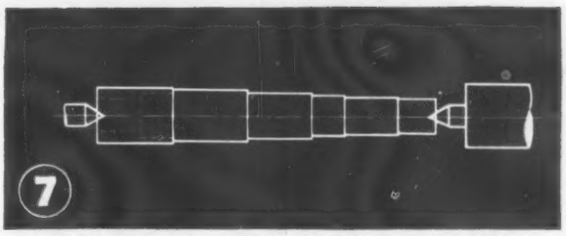
see MONARCH

Monarch's electric leadscrew reverse and rapid return. Threads are chased toward the headstock at 425 rpm, and carriage returned to starting position at 1000 rpm, or faster if desired.

7 Machining time on this shaft was cut 23% by using a Monarch Automatic Sizing Lathe with Automatic Feed Changes. The job has five diameters, with feed rates automatically ranging from ½″ to 2″ per minute, determined by depth of cut. Without automatic feed changes, all diameters would be machined at the feeding rate for the starting diameter.



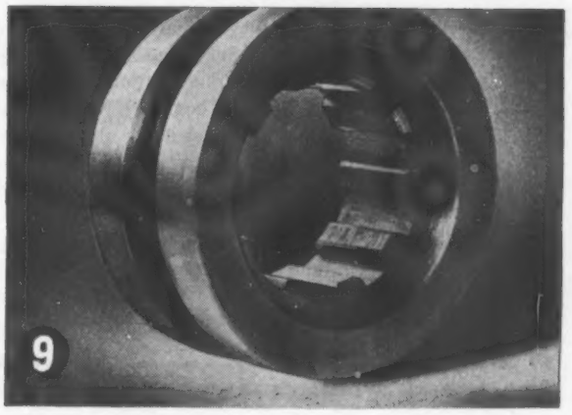
8 Rough turning, facing and back facing cylinder head flanges on a Monarch Lathe. Work is gripped in an air chuck on a rough surface. Alignment is checked with special fixture in tailstock. Capstan handwheel permits quick movement of fixture to and from work. Tool blocks, on front and rear of cross slide, hold forming and turning tools. Front tools do part of operation, then feed is reversed in apron; slide traversed for rear tool operation, with power feed and working to automatic diameter stop. Only one set-up required.



9 One lathe and operator are used on this job, with a single set-up, instead of three separate set-ups as job was first done. Turning outside diameters, forming groove, straddle facing sides and chamfering four outside corners were done in eight minutes on a Monarch 18″ Model BB Lathe.

Of course, the outstanding precision, ease of control, smooth operation and the ability of Monarch Lathes to stand up under heavy pressure, all were finally responsible for the results obtained.

If any of these examples suggest ways of cutting your present or future costs, Monarch engineers will gladly work with you. Send us sketches or blueprints with sufficient description for a complete job analysis, and we'll make recommendations. If it's a turning job, ask Monarch!



THE MONARCH MACHINE TOOL CO. • SIDNEY, OHIO

BRANCHES

622 W. Washington Blvd. Chicago 6, Ill. — 10465 Carnegie Ave. Cleveland 6, Ohio — 635 Industrial Office Bldg. Newark 2, N. J.

512 Empire Bldg. Pittsburgh 22, Pa. — 801 Fisher Bldg. Detroit 2, Mich.

Representatives in principal cities

Saves Time

BEHIND THE SCENES

Salesmen—Remember?

■ Did you see that cartoon the other day showing the secretary announcing to her boss that there was a man in the outer office selling something and that he could let him have five minutes of his time?

Of course, we all know it never really did get quite that bad and that it's not going to be too long before the salesmen are out doing again what their name implies. And if you don't have something like it already, you might well want to take a hint from the American Welding & Mfg. Co. at Warren, Ohio on how to make a salesman welcome when he comes peddling his wares.

Upon entering the company offices, he is handed a neat four-page pamphlet with complete information regarding the company's business. Included is a list of all the executive personnel, a map of the city, instructions as to where one may find public phones, rest rooms, hotels, cabs, and also a brief history of the company itself.

Solution

■ That little puzzler about the Chicago-New York trains a couple of weeks ago brought everything from yawns of boredom to plaintive telephone calls for help to settle bets. And, of course, those in the latter category felt a mite silly with the answer that neither train could be closer the instant they passed each other. But we felt just as silly when we were asked in return just how you can take a through train from Chicago to New York and make a stop in both Cleveland and Pittsburgh!

Stop Us If You've Heard It

■ Have any of your suppliers reached this height of something or other?

Having wired, "Due your slow delivery cancel our order immediately", the merchant received this prompt reply from the factory: "Impossible to cancel immediately—you will have to take your turn."

Aptronym

■ The *Foundry Trade Journal* (London, Eng.) in its January 4 issue reports the following noteworthy (and noseworthy) item:

J. F. Noseworthy & Son (Pty.), Ltd. of Cape Town, have just completed a contract for the supply of a complete plant for a fish canning factory.

The Postwar Faucet-Kitchen

■ As we get it the way the whole thing started was that the designer for the Schaible Co. was staying downtown one night for a product-planning conference and was having dinner with the company Sales Manager, the conversation turning about what the public expects and what they will actually get in post-war houses.

It being company expense, the designer started dinner with a half-dozen Bluepoints (oysters, not ration points). But then his mind began to wander to new designs for faucets and strainers, because these were the items he was going to work on first. Soon he was so engrossed that ordering and eating became purely subconscious and he not only started with Bluepoints, he proceeded to eat them between each course! Hustling home to bicarbonate and bed, he fell to sleep and there came upon him the granddaddy of all wild nightmares. Before him loomed the dim outlines of strange giant revolving faucets and spinning cup-floors all mixed together with gleaming magazine sketches of the kitchens of tomorrow. Then out of that terrible chaos the big idea came into focus—the Postwar Faucet-Kitchen! He was jarred into semi-consciousness, jumped out of bed and sketched his vision on paper.

Well, it seems The Schaible Co. has more than just a passing interest in the Kitchens of Tomorrow, so they have reproduced full details of the Faucet-Kitchen in an exciting folder which you can get by simply writing them, attention "Tomorrow Department", Cincinnati 4, Ohio. We'd like to spoil it all for you now and tell you about the Cleansomatic, the Breeze-Drier, and the combination Kitchen Pool and Hockey Pond, but we won't. Instead, spend that 3 cents and get a good half-hour's laugh.

Health Routine

■ It's probably treason to all the time and dollars that have gone into medical research on vitamins, but our simple case, Mr. Anthony, is just this: Through two months of lousiest, coldest and dampest weather we've ever experienced, our health has never been better. Not one sniffle or even a sneeze. Then last week we figured it was high time to get smart and take some of those oversize vitamin B capsules every morning and be really healthy.

That's right, you've guessed it—two days later we had the darnedest cold you ever saw!

New Type of Census

■ Haven't you had those days lately when you'd agree 100% with this set of calculations?—

Population of the United States	**135,000,000**
Number of people over 65	**37,000,000**
Left to do the Work	**98,000,000**
Number of people under 21	**54,000,000**
Left to do the Work	**44,000,000**
Working for the Government	**21,000,000**
Left to do the Work	**23,000,000**
In Armed Forces	**10,000,000**
Left to do the Work	**13,000,000**
Working in State Offices	**12,800,000**
Left to do the Work	**200,000**
Number of bums in country who won't Work	**199,998**
Left to do the Work	**2**

In other words, that leaves just Roosevelt and ourselves and since he's off running around the world half the time, we're getting plenty damned tired of running this whole country ALONE!

Vol. 116, No. 7, February 12, 1945, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countires, 1 year $12. Current issues, 25c. Yearbok of Industry issue, $2.00.

Editorial Contents—Page 55

For hearth and slag line maintenance, open hearth men like Magnefer, the well-known, standard clinkered dolomite, so uniform in sizing and unexcelled in performance.

FIRST HELPER FOR LOWER HEARTH MAINTENANCE

HOW can open hearth "delay time" be reduced—now that furnaces are so pushed, month after month, at capacity operation?

The answer lies in the policy of using the best refractories available and in efforts constantly to improve refractory practice.

We supply basic refractories that support such a policy... refractories carefully designed and accurately controlled in manufacture to have desirable physical, chemical and mineralogical properties which enable them to meet severe furnace conditions.

The greatest plus value in Basic Refractories products, however, is that they are sold and serviced by representatives who intimately know steel making. "Basic" Sales Engineers are practical steel men, with years of experience making steel. This experience they supplement with a sound knowledge of basic refractories. Often they are able to offer suggestions which help solve tough problems, and so improve refractory practice—in slag line maintenance, in bottom repair, in new hearth construction.

So think of the "Basic" Sales Engineer as your "First Helper" for lower hearth maintenance costs. Use his knowledge and experience freely, to insure that the dependable basic refractories you get from him are yielding the best possible results.

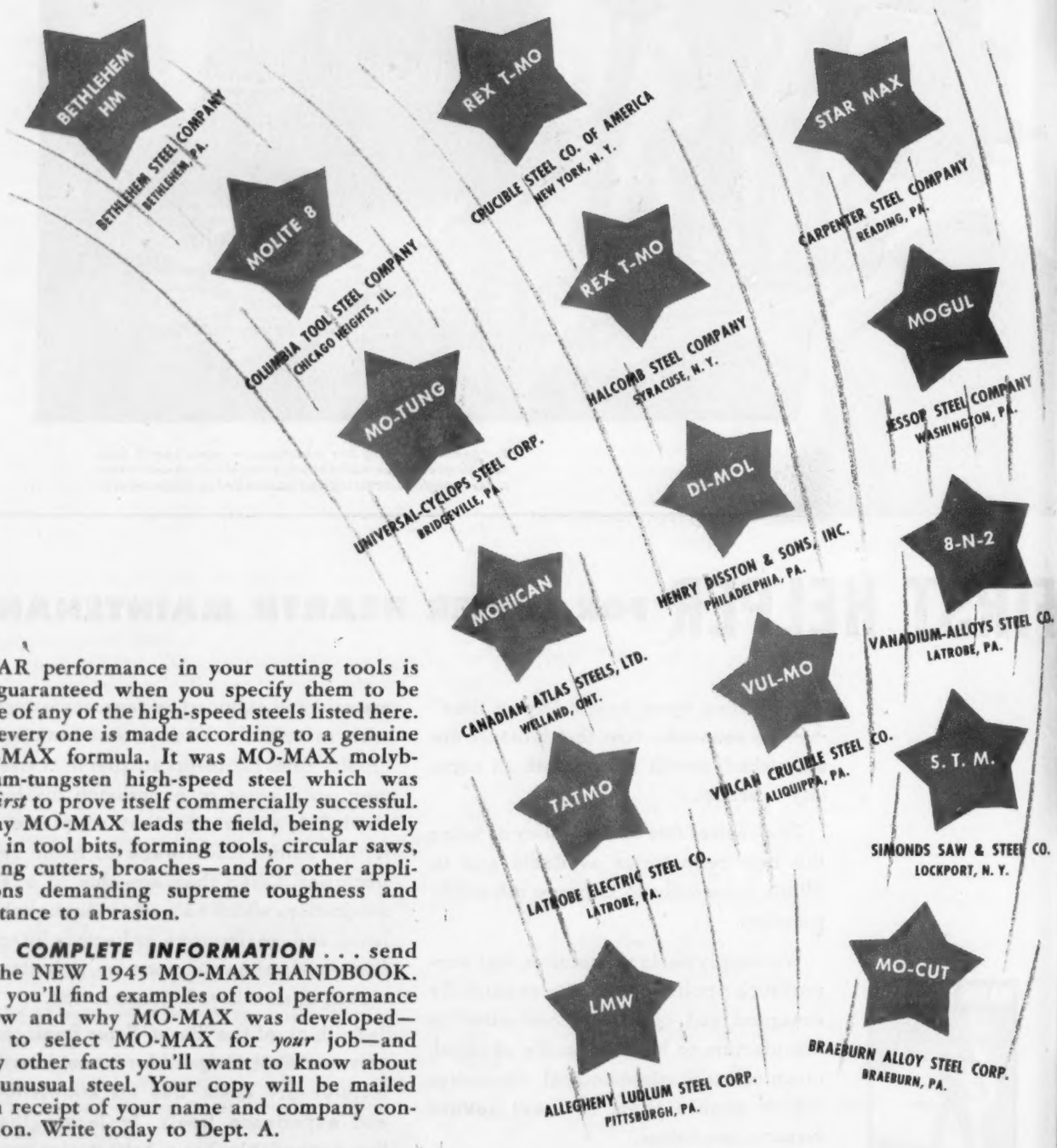
BASIC FURNACE REFRACTORIES

BASIC REFRACTORIES, INCORPORATED

845 HANNA BUILDING
Cleveland 15, Ohio

THESE HIGH-SPEED STEELS ARE YOUR ASSURANCE OF

STAR PERFORMANCE



STAR performance in your cutting tools is guaranteed when you specify them to be made of any of the high-speed steels listed here. For every one is made according to a genuine MO-MAX formula. It was MO-MAX molybdenum-tungsten high-speed steel which was the *first* to prove itself commercially successful. Today MO-MAX leads the field, being widely used in tool bits, forming tools, circular saws, milling cutters, broaches—and for other applications demanding supreme toughness and resistance to abrasion.

FOR COMPLETE INFORMATION . . . send for the NEW 1945 MO-MAX HANDBOOK. In it you'll find examples of tool performance—how and why MO-MAX was developed—how to select MO-MAX for *your* job—and many other facts you'll want to know about this unusual steel. Your copy will be mailed upon receipt of your name and company connection. Write today to Dept. A.

THE CLEVELAND TWIST DRILL CO.
1258 East 49th St. Dept. A Cleveland 14, Ohio

THEY'RE ALL **MO-MAX**

OUTPUT IS JUST AS IMPORTANT AT THE END OF THE DAY!

YOU can sometimes blame equipment for that day-end fall in the production curve.

Northwest realized that a long time ago—and introduced the "Feather-Touch" Clutch Control. The "Feather-Touch" Clutch Control takes the fatigue out of Northwest Crane operation by utilizing the power of the engine to shift the heavy drum clutches. The operator has the "feel" of the load at all times. He can "set" the load to a fraction of an inch. Release is positive. No delicate parts. Nothing to refill. There are no high pressure lines, nothing to leak and it is unaffected by weather conditions.

You won't have any shut downs because of failure of controls on a Northwest. Let us tell you more about this Northwest advantage.

NORTHWEST ENGINEERING COMPANY
1805 Steger Building 28 East Jackson Boulevard
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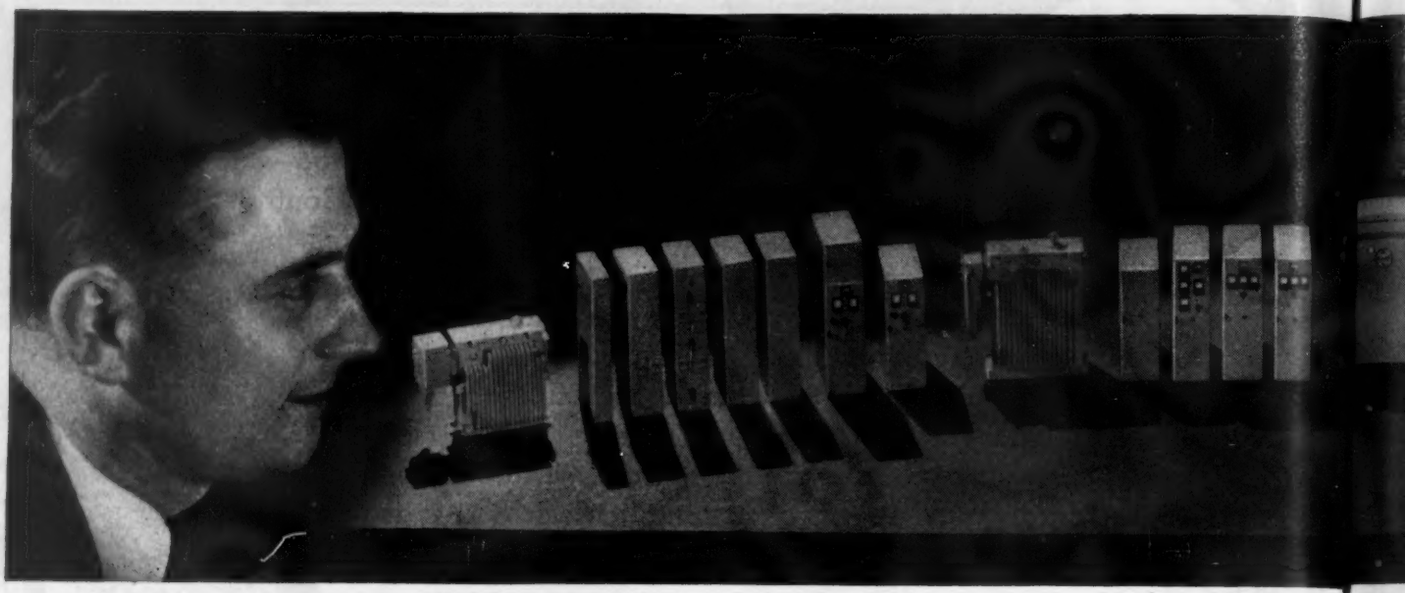
Have you read the NORTHWEST AD Today?

NORTHWEST
The Crane that goes Anywhere!

Let's get acquainted INVESTIGATE THIS Different CRAWLER CRANE

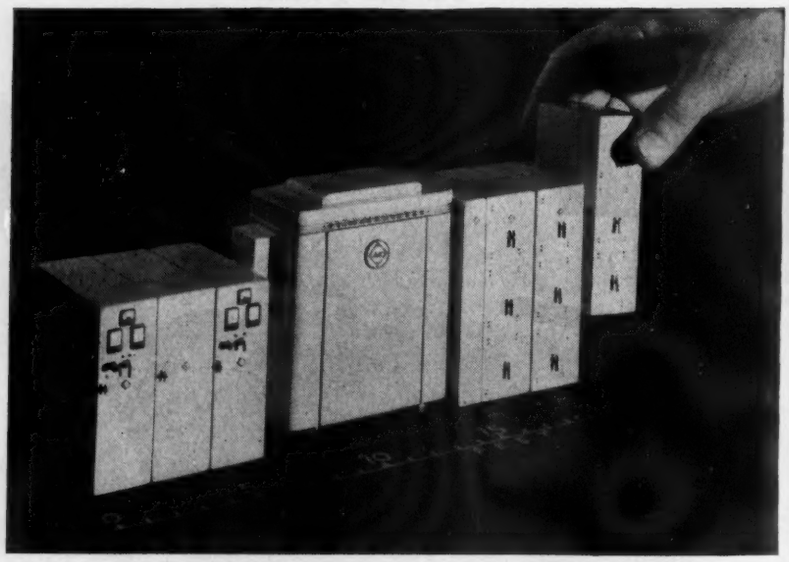
BUILT IN A RANGE OF 10 SIZES — 4½ TONS CAPACITY AND LARGER

Here's what you



Here's how you

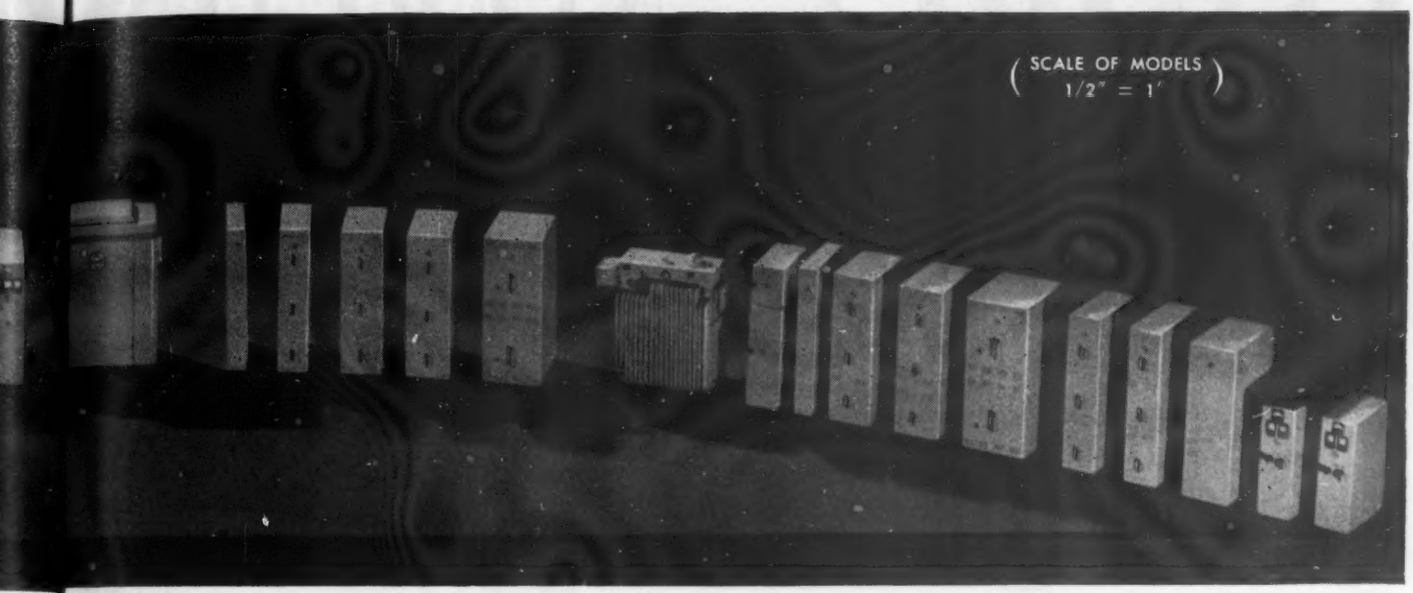
1 YOU SEE WHAT'S AVAILABLE — without bogging down in tables, charts, diagrams. Accurately constructed—½ in. to 1 ft — models eliminate all guesswork in unit substation planning. And they're idea-stimulating . . . hard to keep your hands off.



2 YOU EXPERIMENT. Unit substation arrangements are assembled quickly . . . allowing easy comparison of alternate plans. Thirty-eight models permit you to see for yourself the great flexibility of Allis-Chalmers unit sub equipment . . . determine the *right* substation for your plant. A field engineer from your nearby A-C district office will be glad to show the models. There's no obligation.

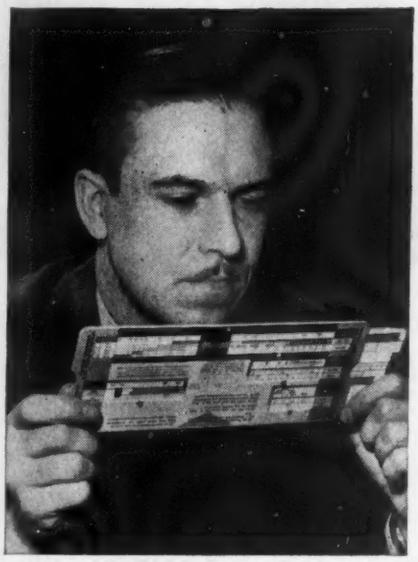
SEE YOUR UNIT SUB IDEAS WORKED OUT WITH ALLIS-

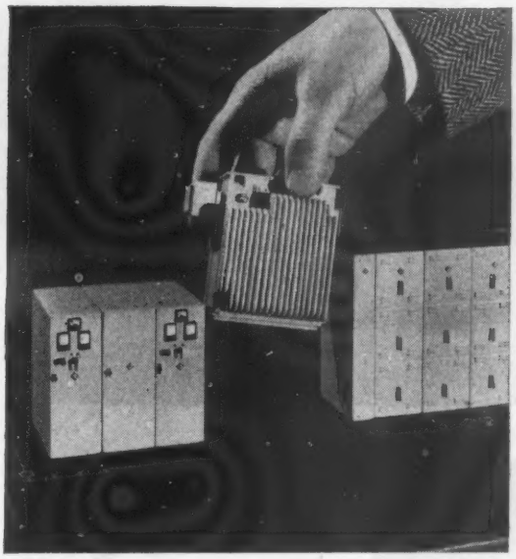
have to work with

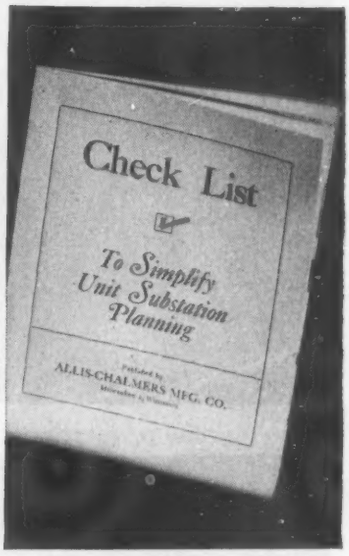


work:

When you use Allis-Chalmers scale models to help solve Unit Sub problems!







3 **YOU DETERMINE** what size circuit breakers will be needed when you use Allis-Chalmers' handy Unit Sub Slide Rule to calculate secondary short circuit current quickly, easily, accurately.

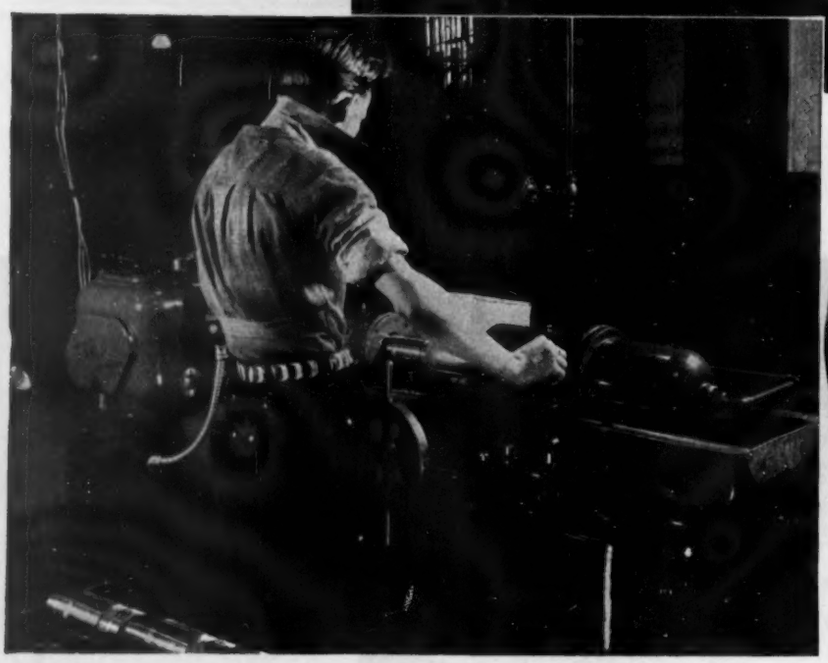
4 **YOU VISUALIZE SOLUTIONS** to your power distribution problems right on the top of your desk. At a glance, you see what space your proposed unit substation will occupy. You also see how it will look when actually installed in your plant.

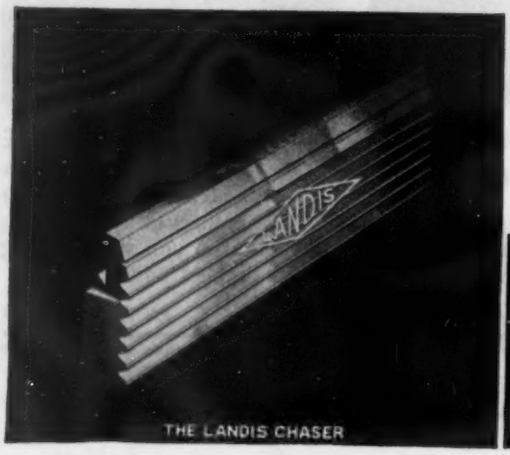
5 **YOU DOUBLE CHECK** with A-C's Check List book which reduces every basic consideration in unit sub planning to its simplest possible form.

Tune in the Boston Symphony, Blue Network, every Saturday at 8:30 pm, EWT. A 1828

CHALMERS "UNIT SUB BUILDER" SET

LANDIS Leads in Accuracy





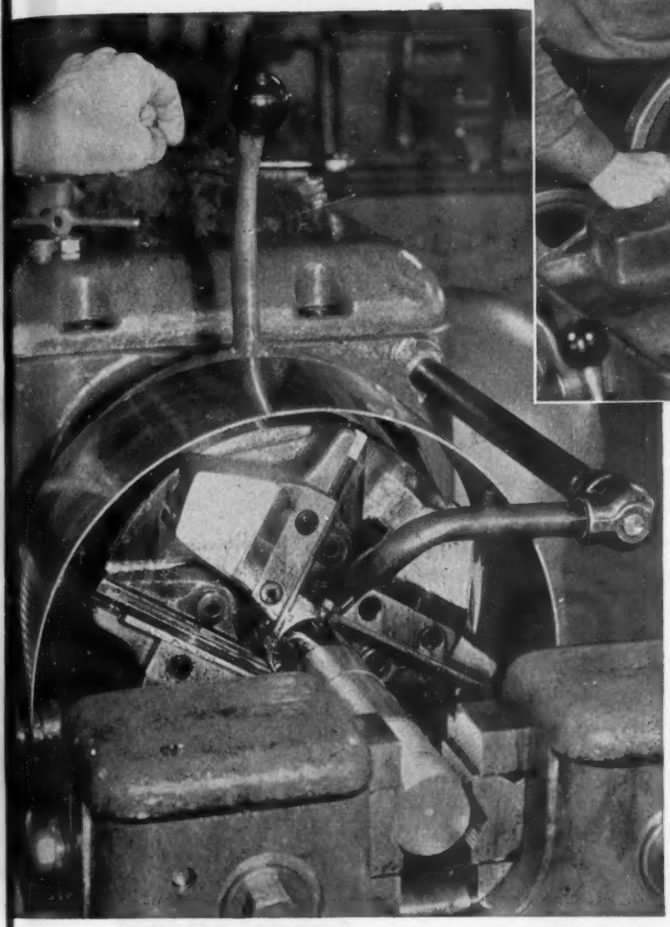
THE LANDIS CHASER

Write for Bulletin

"Be Threadwise—LANDISize"

LANDIS

Quality Performance



Landis Long-Life Tangential Chasers produce 28 linear feet of threads per hour for a manufacturer of alloy steel studs as compared with 12 linear feet under previous method—an increase of over 100%.

An average of 15 bars—more than 5 hours continuous production — are threaded before the chasers require regrinding. Threads are held to class 3 specifications.

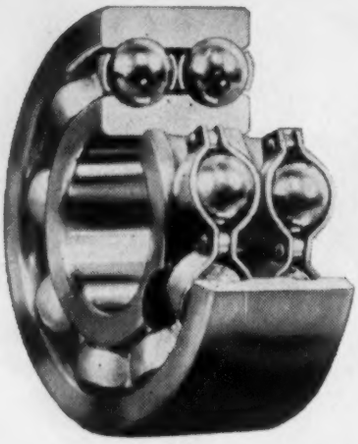
For Higher Threading Speed and Longer Runs between Grinds use LANDIS TANGENT TYPE CHASERS.

For Quality, Accuracy and Performance Landis offers you the World's Finest Threading Equipment, tested and proven by actual operation in thousands of plants.

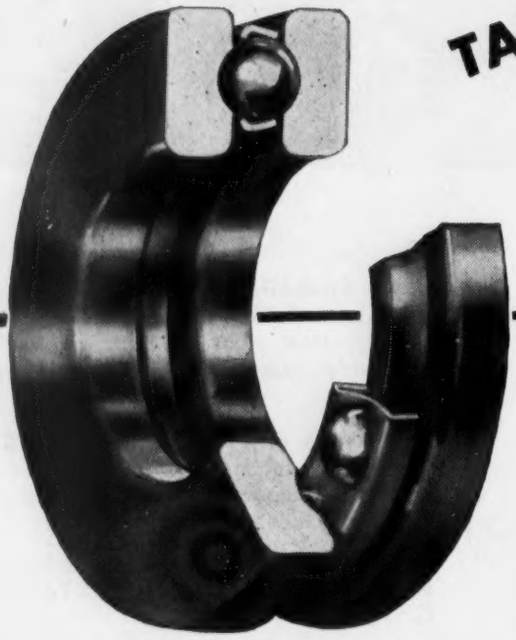
Landmaco Threading Machines, Die Heads and Chasers have been setting new performance records in cutting—with precision accuracy—the countless threads employed in producing materiel of war.

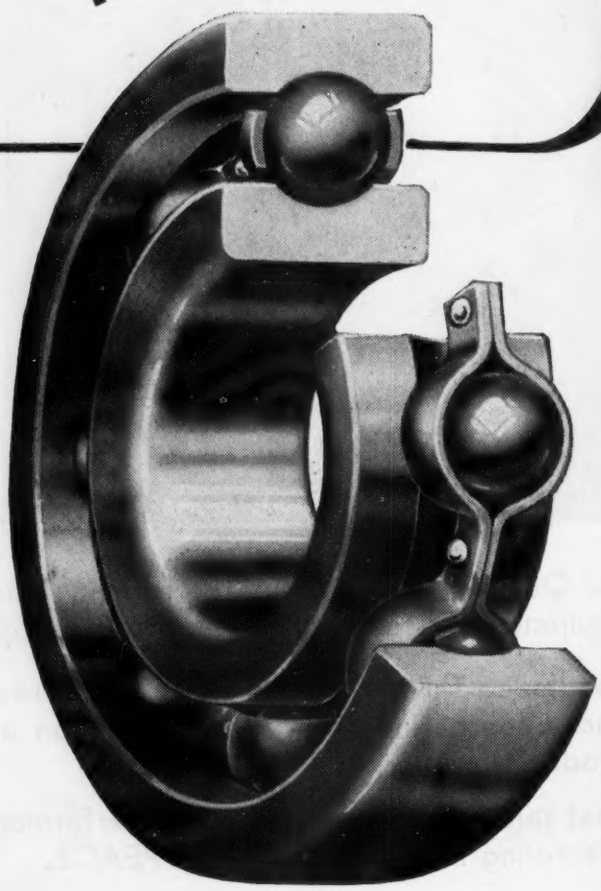
That same quality, accuracy and performance will solve your threading problems in manufacturing the PRODUCTS OF PEACE.

MACHINE CO. WAYNESBORO PENNA. U.S.A.



THE EQUIPMENT *Never* TAKES THE BEARINGS FOR GRANTED





BEARINGS are familiar equipment parts, but designers cannot safely take them for granted. Because the equipment never does!

If bearings have been carelessly selected, the machine refuses to function efficiently... breaks down. That's why bearings must be carefully considered *at the time the equipment is designed.*

Use *ball* bearings wherever they are practical. Before writing specifications, carefully study the factors of friction, speed and loads.

You're sure of careful, rugged construction and long life when you choose BCA Ball Bearings. BCA engineers will gladly help you select the right bearings for any standard or new equipment you may be planning.

BEARINGS COMPANY OF AMERICA
LANCASTER, PENNSYLVANIA

BCA

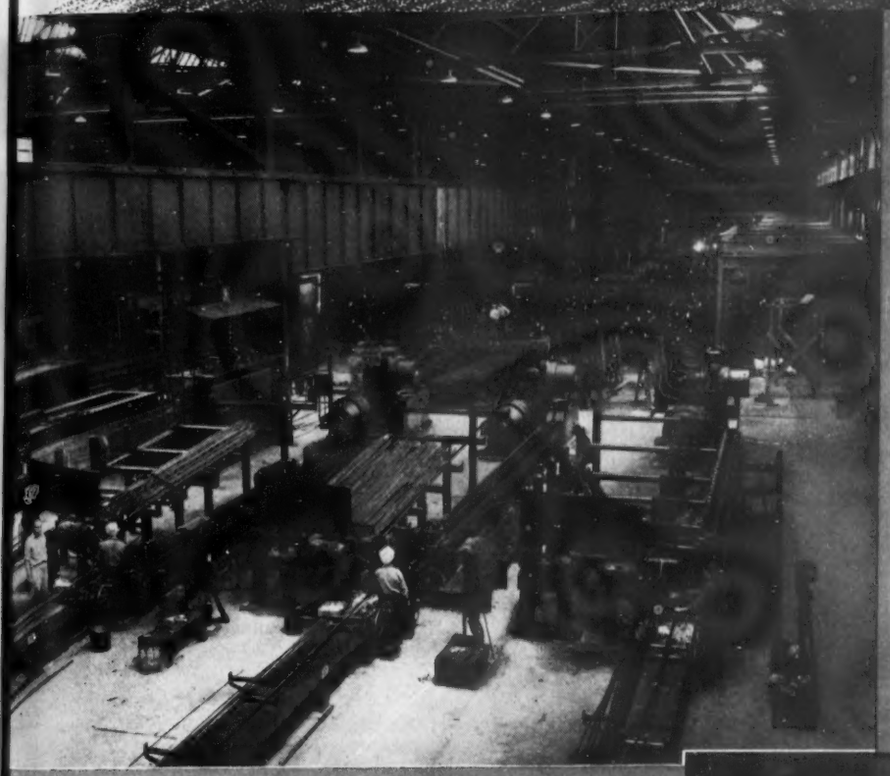
RADIAL • ANGULAR CONTACT • THRUST
BALL BEARINGS

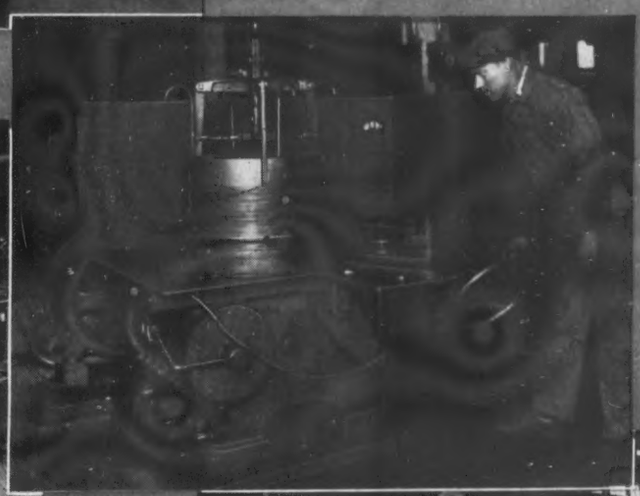
Skilled Vaughn engineering, long Vaughn manufacturing experience, exacting Vaughn craftsmanship... summed up in Vaughn Machinery's performance on-the-job . . . place this equipment *first* in the consideration of modern operating and purchasing executives, for every cold drawing requirement!

THE VAUGHN MACHINERY COMPANY

CUYAHOGA FALLS, OHIO

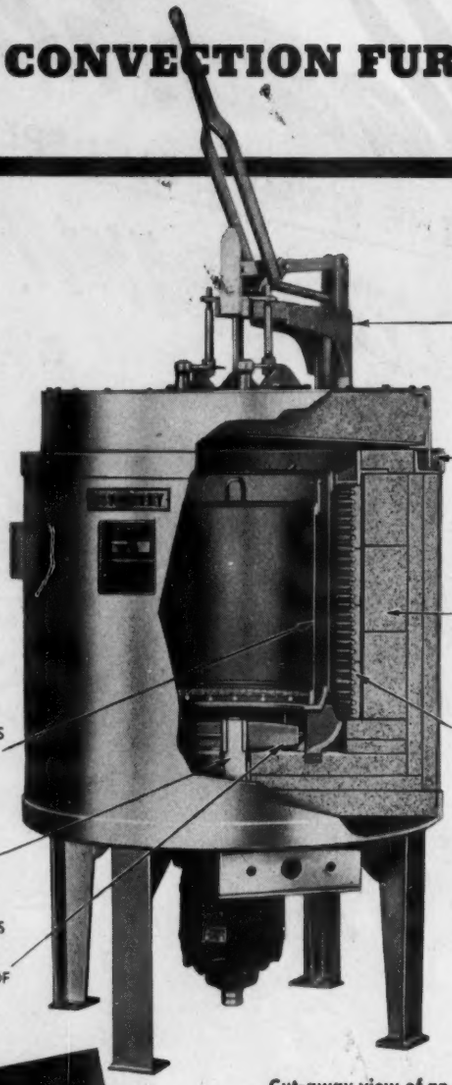
COMPLETE COLD DRAWING EQUIPMENT... Continuous or Single Hole ... for the Largest Bars and Tubes ... for the Smallest Wire ... Ferrous, Non-Ferrous Materials or their Alloys.



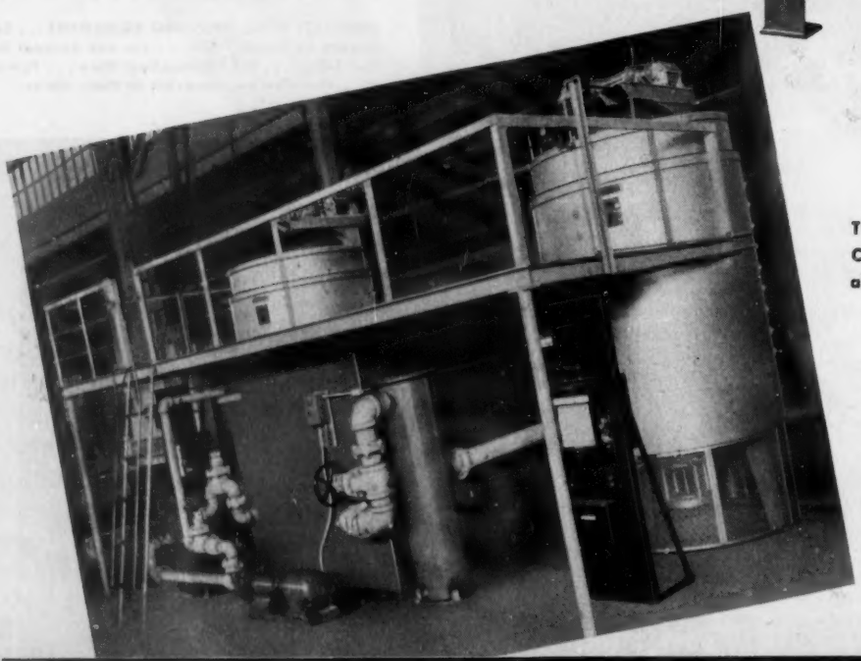


HEVI DUTY *Pit Type* CONVECTION FURNACES

The Hevi Duty Pit Type Convection Furnace is used for aluminum heat treating, and for drawing and annealing ferrous and nonferrous metals up to 1400° F.(760° C.). The use of a high velocity fan assures uniform heating of the work even when the parts are small. This furnace can be built for use with protective atmospheres at temperatures up to 1750° F. (955° C.).


SIMPLE MANUAL COVER OPERATING MECHANISM
COVER SEAL
PREFORMED GRADED INSULATION
HEVI DUTY HEATING ELEMENTS SYMMETRICALLY ABOUT THE HEATING CHAMBER SUPPLY HEAT LOSSES WHERE THEY OCCUR
BASKET SIDE PROVIDES DEAD AIR SPACE TO PREVENT DIRECT HEATING
FAN AND SHAFT REMOVABLE THRU THE HEATING CHAMBER
LARGE FAN PROVIDES HIGH RATE OF CIRCULATION WITH UNIFORM HEATING OF WHOLE CHARGE

Cut-away view of an HD-1620 Pit Type Convection Furnace.



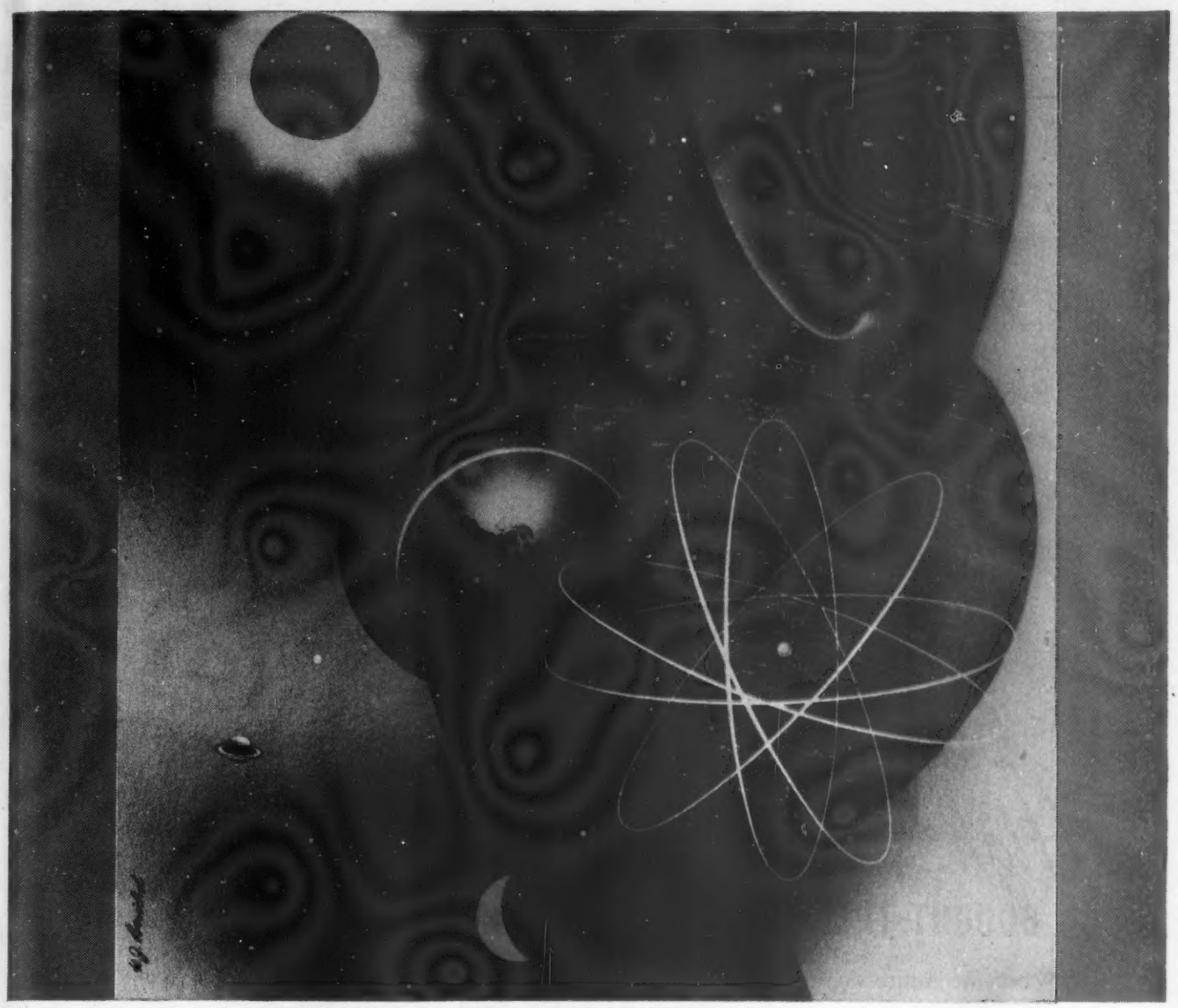
Two large Hevi Duty Pit Type Convection Furnaces in an alloy steel fabricating plant.

Send for Bulletin HD-1041

HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES HEVI DUTY ELECTRIC EXCLUSIVELY

MILWAUKEE, WISCONSIN



Electronic Futures
ARE AS LIMITLESS AS SPACE

But... IT TAKES Special Electrical Alloys TO TRANSLATE FANCIES INTO FACTS

AS alloy steel specialists, one of our jobs for many years has been the researching and commercial development of special electrical materials—highly individualized alloys which have helped many a designer to realize in fact what he hoped for in theory. We developed a number of these materials, and some of them are at the heart of the war's most valuable contributions to the electrical and electronic sciences of the future.

The Allegheny Ludlum line of finely developed silicon steels, high-permeability and high-resistance alloys, and glass-to-metal sealing alloys is most complete. What's more, it is backed by exhaustive data on characteristics and performance, and amplified by full technical cooperation. ●Whatever you want to do, electrically or electronically, let us work with you. Allegheny Ludlum Steel Corporation, Brackenridge, Pa.

ALLEGHENY LUDLUM
Suppliers to the Electrical Industry

ALLOYS DEVELOPED AND PROVED FOR SPECIAL CHARACTERISTICS

W&D . . . 9576-B

Photo courtesy of Addressograph-Multigraph Corporation

High Priorities...

BOUGHT THIS BRUSH SURFACE ANALYZER

When the Addressograph-Multigraph Corporation in Cleveland, found it necessary to accurately measure the surface finish on grained zinc plates, they bought a Brush Surface Analyzer to do the job. Now, they are able to control these surfaces to micro-inch roughness by studying graphic readings of the irregularities measured to one millionth of an inch (.000001").

This instrument was purchased with a high priority rating. No longer is this necessary. Greatly expanded production facilities are now enabling us to make *prompt delivery* with *no priorities.*

The Brush Surface Analyzer is an indispensable tool in modern production where closer control of surface finish is greatly emphasized.

See how this instrument can best serve your production needs by a demonstration at your plant.

Also write for a free brochure—"Surface Finish—.000001 inch."

THE BRUSH DEVELOPMENT COMPANY

3353 PERKINS AVENUE • CLEVELAND 14, OHIO

Follansbee

for Special Handling of a Staple Product . . .

Special handling of orders, quicker adjustment of production schedules to accommodate unusual situations—these are among the advantages which Follansbee's compact, flexible organization offers to purchasers of Cold Rolled Strip.

In addition, where requirements are exacting, the skills acquired through long experience in the manufacture of high quality steels and steel specialties enable Follansbee to produce Cold Rolled Strip to the precise temper, gauge, width and finish desired.

Should this special attention interest you, you'll find it profitable to have Follansbee as your supplier of Cold Rolled Strip . . . and for your other steel requirements.

FOLLANSBEE STEEL CORPORATION

GENERAL OFFICES • PITTSBURGH 30, PA.

Sales Offices—New York, Philadelphia, Rochester, Cleveland, Detroit, Milwaukee. *Sales Agents*—Chicago, Indianapolis, St. Louis, Nashville, Houston, Los Angeles, San Francisco, Seattle; Toronto and Montreal, Canada. *Plants*—Follansbee, W. Va. and Toronto, Ohio

ALLOY BLOOMS & BILLETS, SHEETS & STRIP • COLD ROLLED CARBON SHEETS & STRIP
POLISHED BLUE SHEETS • ELECTRICAL SHEETS & STRIP • SEAMLESS TERNE ROLL ROOFING

COLD ROLLED STRIP

Yesterday, today and tomorrow—

A Major Contributor

to grinding wheel advancement

IN HOLDING closely to the original policy of its founders to produce only the finest grinding wheels it is possible to build, Peninsular engineers have carried on a continuous and ever-expanding program of study and experimental research since 1889.

Out of the long hours and inventive skill devoted to this pioneering effort have come many new and basic advancements in the fabrication of abrasive wheels—in the machinery for their manufacture—and in the methods for their application to modern industrial problems.

The fine reputation that Peninsular enjoys today is largely the result of these major contributions to the grinding wheel industry.

In the days to come, you may expect from Peninsular continued improvements to help industry speed up the war effort and be ready for conversion to peacetime production when victory is won.

A STANDING INVITATION

Our expert staff of factory and field engineers are ready today to help in your postwar preparation—with a production, engineering and cost analysis service beyond any offered up to now in the industry.

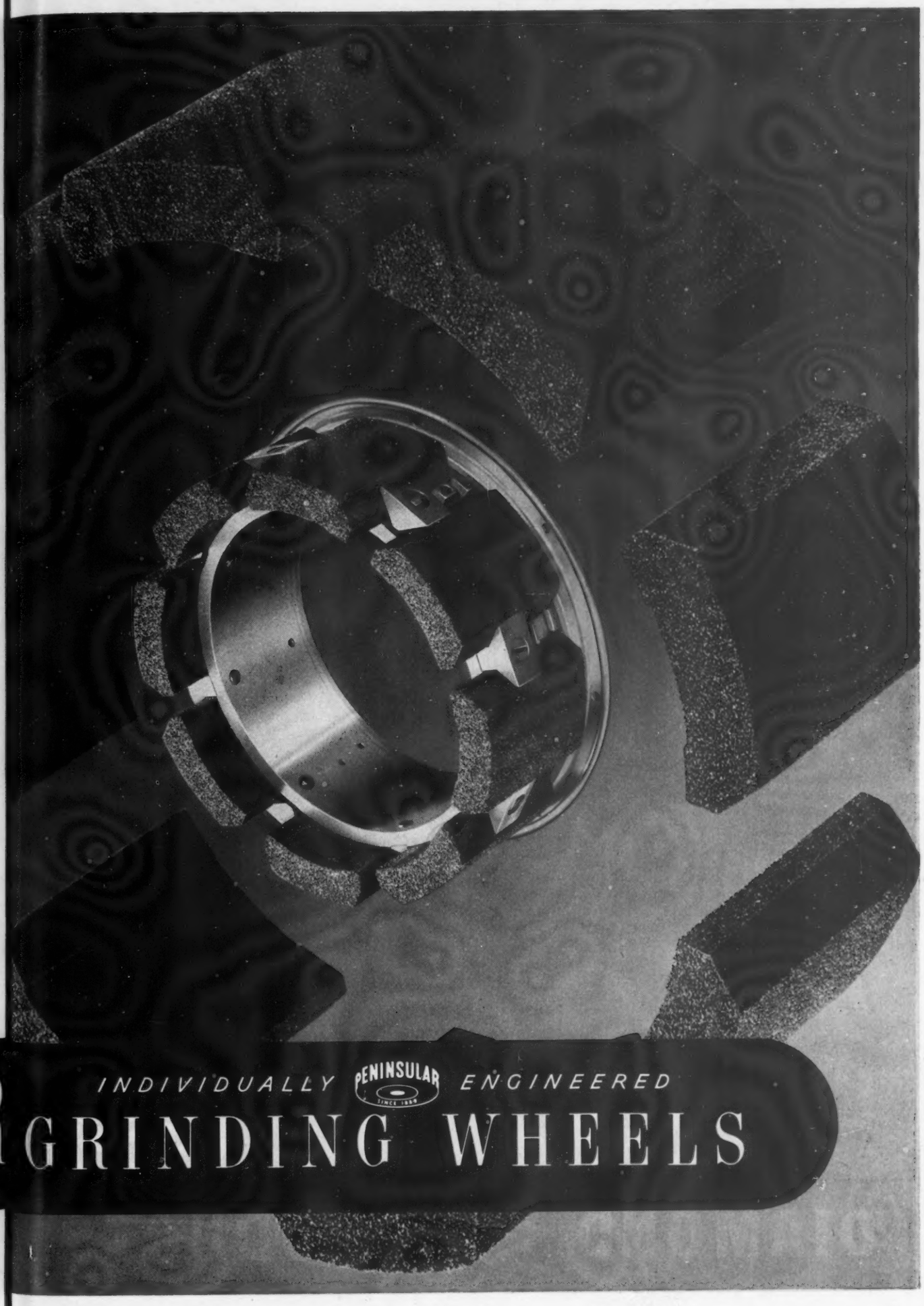
The Peninsular Grinding Wheel Company, 729 Meldrum Ave., Detroit 7. *Branches*: Philadelphia, Chicago, Cleveland, Newark, Pittsburgh.

SPECIALISTS IN RESINOID BONDED WHEELS

PENINSULAR G

SINCE 1889

Illustration shows segments and chuck for surface grinding.


INDIVIDUALLY PENINSULAR ENGINEERED
GRINDING WHEELS

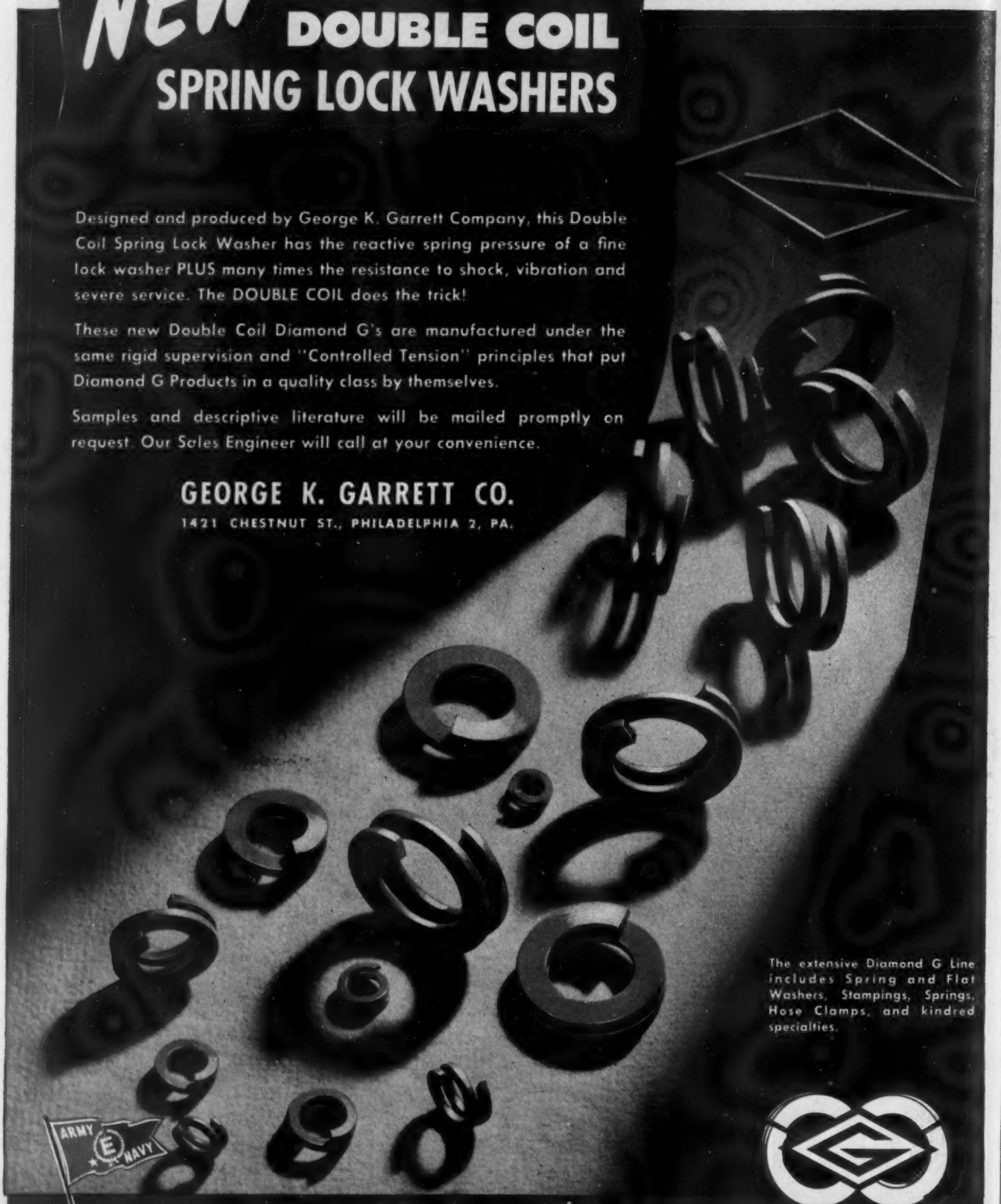
NEW DIAMOND G DOUBLE COIL SPRING LOCK WASHERS

Designed and produced by George K. Garrett Company, this Double Coil Spring Lock Washer has the reactive spring pressure of a fine lock washer PLUS many times the resistance to shock, vibration and severe service. The DOUBLE COIL does the trick!

These new Double Coil Diamond G's are manufactured under the same rigid supervision and "Controlled Tension" principles that put Diamond G Products in a quality class by themselves.

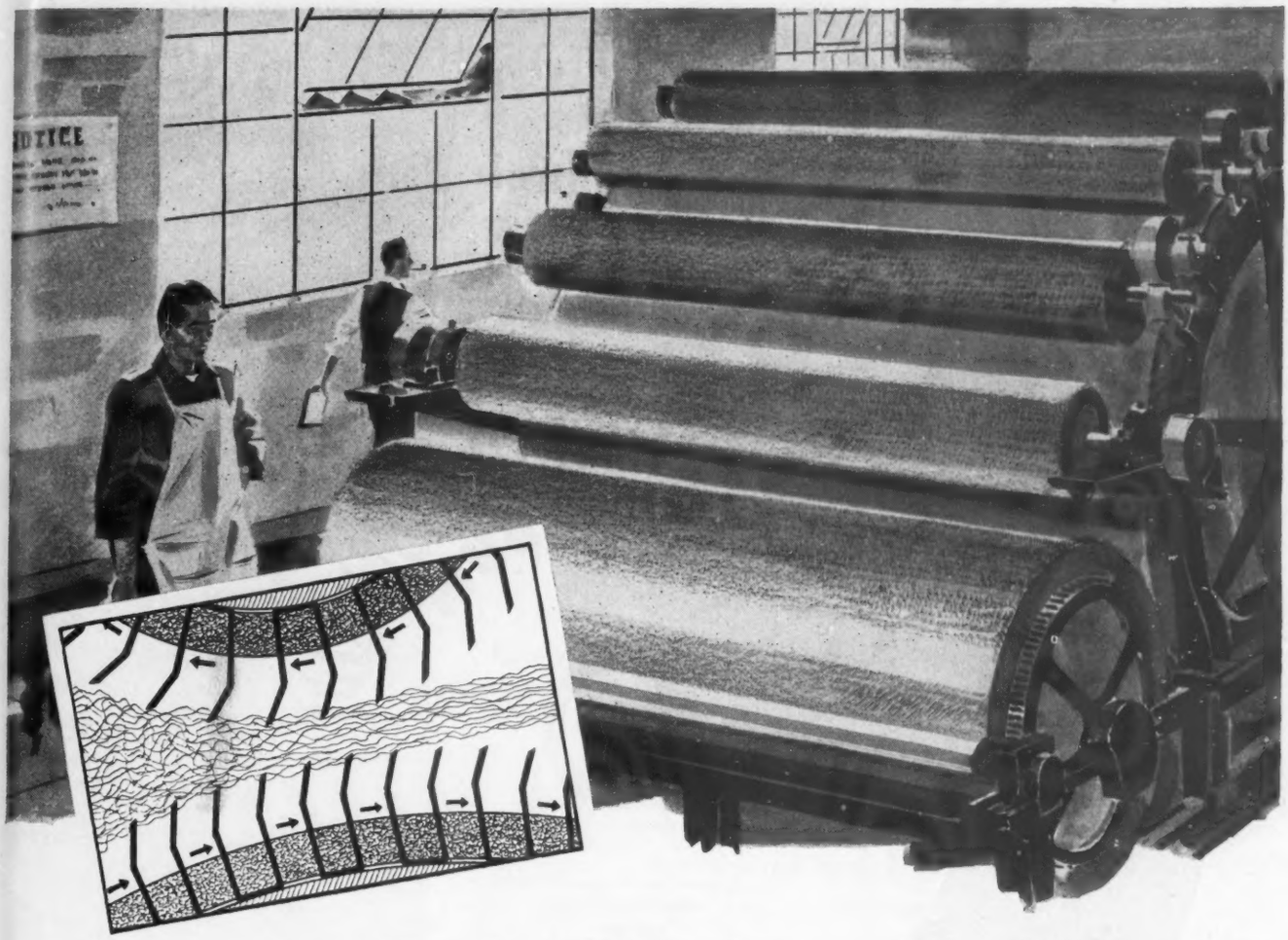
Samples and descriptive literature will be mailed promptly on request. Our Sales Engineer will call at your convenience.

GEORGE K. GARRETT CO.
1421 CHESTNUT ST., PHILADELPHIA 2, PA.



The extensive Diamond G Line includes Spring and Flat Washers, Stampings, Springs, Hose Clamps, and kindred specialties.

DIAMOND G PRODUCTS



Carding Wool is a Tug O'Wire!

IN a wool carding machine, thousands of tiny wire teeth tug at each strand of wool until the matted fibers are separated and paralleled sufficiently for spinning. Without this important operation, wool would remain in tangled lumps—totally unfit for manufacturing into cloth.

One of the *vital parts* of this carding machine is the *wire teeth.* Fastened to a backing of fabric or leather—as many as 780 to the square inch, these tiny wire teeth catch the wool fibers, pull them to straight lengths and carry them on to the next roller.

Hard tugging demands *high tensile strength* and *resiliency* in the card wire to prevent breakage or permanent bending. To hold its sharp point and resist the harsh abrasion of tough wool fibers, it must be hard—high in carbon. Finish must be smooth so the wool will not be torn. Add to these rigid specifications a tolerance of only .0002 in diameter, and you see why it takes a *top notch job* of wire drawing to deliver the kind of wire needed for this critical carding operation.

For the past 30 years, Worcester Wire Works has been doing that kind of wire drawing—not only for textile applications but for scores of other industries who demand the *very finest wire* available for their particular requirements.

Our engineering and research staff is ready to help you with your wire problems, to aid in developing special types of wire for your individual purposes, to improve the manufacture of your product or increase its serviceability.

NS
WORCESTER
WIRE WORKS
DIVISION OF NATIONAL-STANDARD

Buy and Keep War Bonds

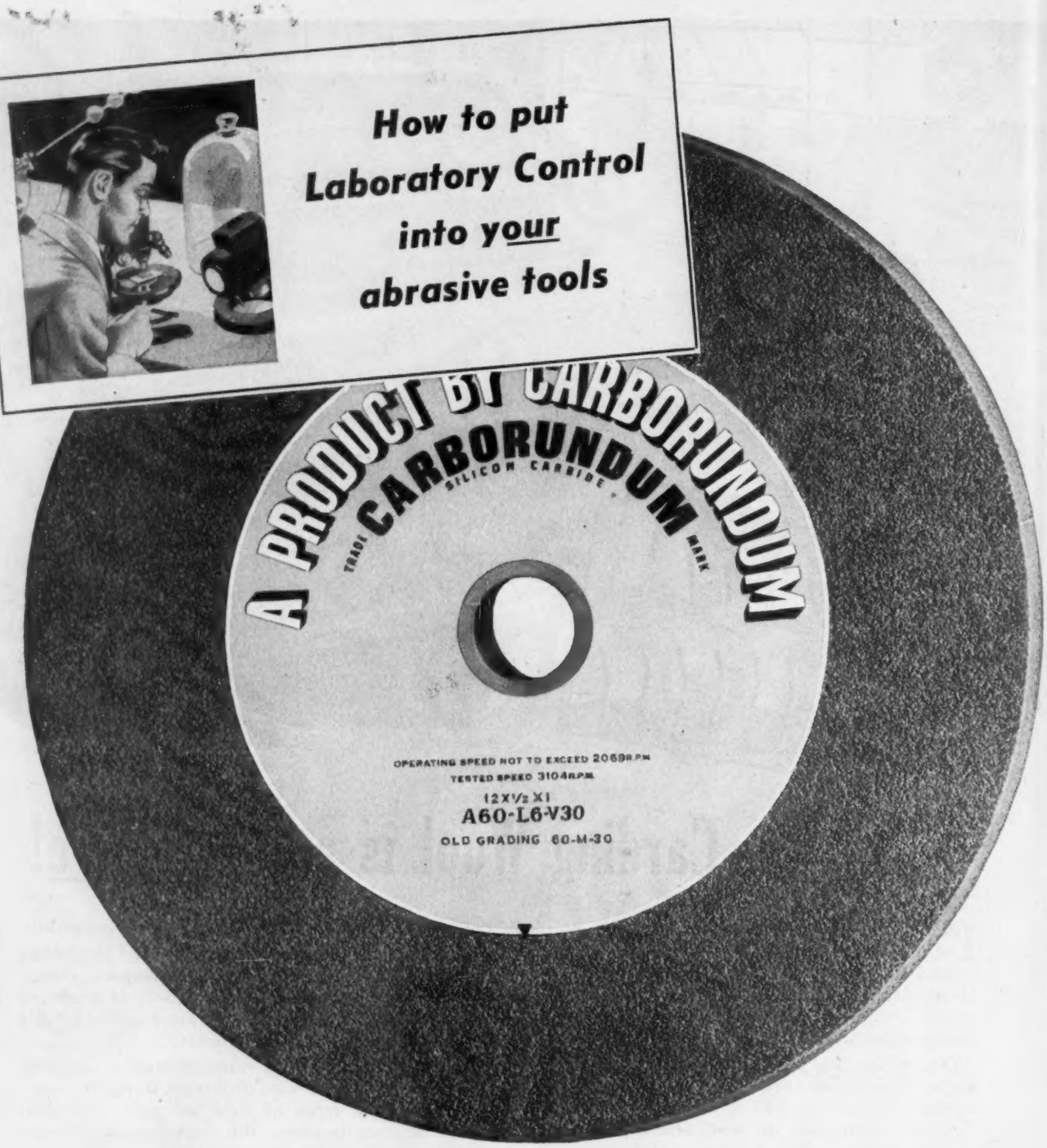
Divisions of National-Standard Company

WORCESTER WIRE WORKS
Worcester, Mass.
•
ROUND STEEL WIRE, SMALL SIZES

NATIONAL-STANDARD CO.
Niles, Mich.
TIRE WIRE, FABRICATED BRAIDS AND TAPE

THE ATHENIA STEEL CO.
Clifton, N. J.
COLD ROLLED, HIGH CARBON SPRING STEEL

WAGNER LITHO MACHINERY CO.
Hoboken, N. J.
LITHOGRAPHING AND SPECIAL MACHINERY



ONE answer is to buy every type of Abrasive Tool from "CARBORUNDUM"! Each ingredient in every product by "CARBORUNDUM" undergoes carefully supervised laboratory tests. This testing assures rigid control of the standards established for quality and product uniformity. Thus, you are assured that each product possesses *all* of the properties essential to a dependable and efficient abrasive tool.

To help you obtain the most efficient operation under even the most difficult conditions, the services of the "CARBORUNDUM" Abrasive Engineers are at your disposal. These men are thoroughly familiar with the proper application of grinding wheels, coated abrasives, abrasive grain, sticks, and "MX" products. For the correct solution to *YOUR* abrasive problems consult a "CARBORUNDUM" representative.

The Carborundum Company, Niagara Falls, N. Y. . . . . Distributors in Principal Cities.

THERE IS A PRODUCT BY

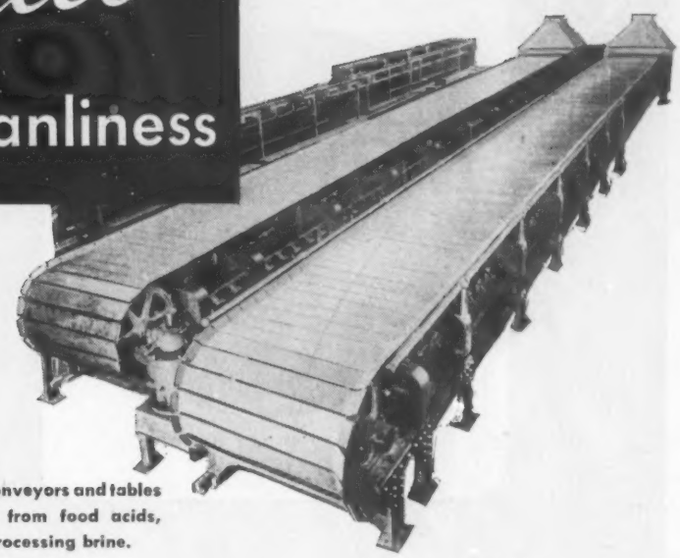
CARBORUNDUM

TRADE MARK

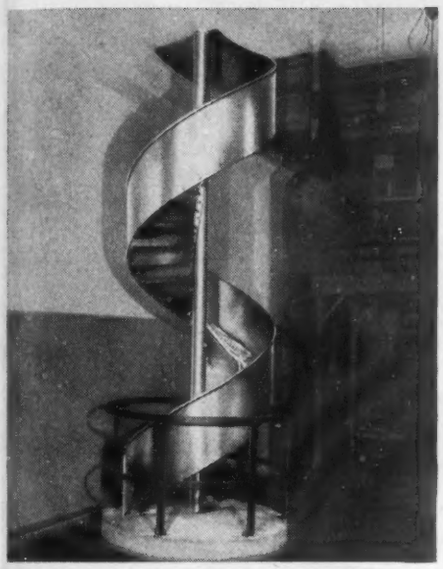
FOR EVERY ABRASIVE APPLICATION

("CARBORUNDUM" and "MX" are registered trade marks of and indicate manufacture by The Carborundum Company)

In Meat Packing Plants *Stainless Steel* Helps to Assure Cleanliness



Stainless steel conveyors and tables resist corrosion from food acids, moisture, and processing brine.



This stainless steel meat chute is a quick and convenient method of moving meat to a lower floor.

Bacon-packing equipment made of stainless steel helps to assure complete sanitation of the packaged product.

Stainless steel equipment provides packing houses with smooth surfaces that can be easily and thoroughly cleaned to assure the sanitation so important in handling any food product. Stainless steel has other advantages too: it resists corrosion from moisture, brine, or fatty acids; it lasts for years; it is attractive in appearance.

Many types of equipment—for slaughtering, inspecting, and cutting, as well as for the preparation of processed meats—give long and satisfactory service when made of stainless steel.

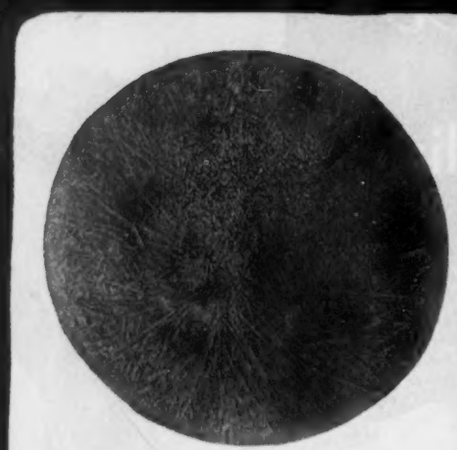
The useful properties of stainless steel make it the ideal material for equipment, not only in meat packing plants, but in canning, quick-freezing, dehydration, beverage, and dairy plants as well.

Although we do not make stainless or any other steels, we do make many ferro-alloys that give new properties to steel and improve its quality. Our metallurgical engineers have accumulated a vast amount of information on the various types of stainless steel. If you are interested in the applications of stainless steel in food-processing, write to us for further information.

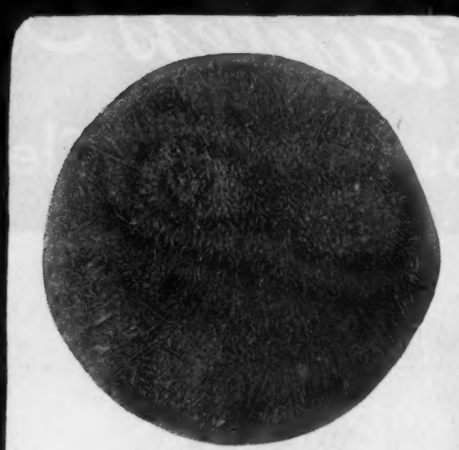
BUY UNITED STATES WAR BONDS AND STAMPS

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

Electromet Trade Mark
Ferro-Alloys & Metals



Steel without Boron.



With .003% Boron.

BORON

has highly useful effects in STEEL CASTINGS

Some of the beneficial effects of Boron on the hardenability and strength of both iron and steel castings were definitely learned many months ago. More recently, its favorable effect on machining quality has become known. Now a quite special but interesting and valuable use has been found in the manufacture of certain pressure castings.

In valves and fittings, for example, voids caused by large dendritic formations are a serious defect. The metallic structure must be dense and uniform, to make sure that no seepage of gas or liquid under pressure will occur. With Boron added in the amount of .003%, the cast metal is found to solidify with much less dendritic pattern and more satisfactory results are obtained.

The two specimens compared above show the structural difference mentioned.

Inquiries concerning any use of Molybdenum, Tungsten, or Boron will be welcomed by the Molybdenum Corporation.

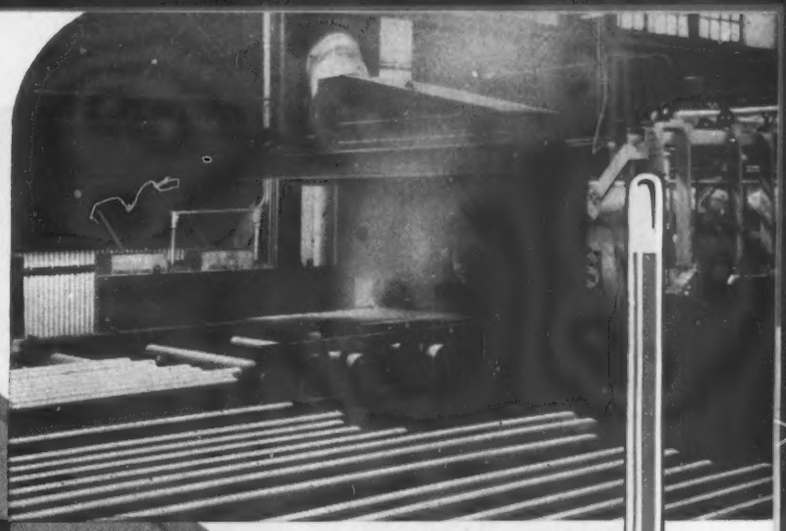
AMERICAN Production, American Distribution, American Control—Completely Integrated.
Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle
Works: Washington, Pa.; York, Pa.
Mines: Questa, N. M.; Yucca, Ariz.; Urad, Colo.

MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

SALEM'S

Engineered Heat



APPLIED TO TUBULAR PRODUCTS

★

THE REQUIREMENTS—A furnace for draw tempering and normalizing steel pipe, 2 to 14" in diameter.

THE DESIGN—Horizontal cylindrical type—100' plus in length.

THE FEATURES—Roller driven hearth; burners firing tangentially into the chamber, providing a rapid, swirling action; two 100' roller tables at either end; five automatic recording temperature zones in the heating chamber; a rayotube instrument which continuously charts the temperature of all tubes being discharged; two-man operation.

RESULTS—Furnace changes from draw temperature to normalizing temperature in one hour and reverses the change, high to low, in two hours. When normalizing, the furnace heats about 20 tons of pipe in one hour and 18 tons when only draw tempering is required.

Salem combines engineering with economics in designing furnaces to suit specific heat treating requirements. We call this service—

SALEM'S Engineered Heat

NOTE — War production has spurred many sensational developments in heat treating, particularly in controls, quenching and fitting the parts to the method. Salem engineers will be glad to discuss these advances with you

SALEM **SALEM** OHIO

ENGINEERING CO.

SALEM ENGINEERING COMPANY

GOOD BEARINGS

ARE BASIC IN GOOD DESIGN

You won't get far in postwar competition without good bearings. And for any machine, a good bearing means simply that type which handles the load most efficiently and economically with the least maintenance cost and worry. That's where Rollway's Right-Angle Loading shines. It reduces load magnitudes and simplifies stresses. There's no piling of thrust loads on radial bearings or radial loads on thrust bearings. Shut-downs for bearing service and replacement are few and far between.

No Oblique Resultants . . .

Rollway's Right-Angle Loading splits compound loads into their two components of pure radial and pure thrust. Each component is carried at right angles to the roller axis on separate bearing assemblies. No oblique loads and resultants, no thermal float or uncalculated thrust can impose secondary pressures on any Rollway Bearing. That means a bearing of given dimension will last longer, or carry heavier loads, or run at higher shaft speeds, or give any proportional combination of all three. Send us your drawings for free analysis. Without cost or obligation, we'll tell you how to get more service from your bearing dollars.

ROLLWAY BEARING COMPANY, INC.
Syracuse 2, N. Y.

since 1908 makers of

ROLLWAY CYLINDRICAL ROLLER BEARINGS

SALES OFFICES: Philadelphia • Boston • Pittsburgh • Youngstown • Cleveland • Detroit • Chicago • St. Paul • Houston • Tulsa • Los Angeles

YOU will want to See this Film...

the dramatic story of ALUMINUM

HERE is a 34-minute educational film on aluminum that is jam-packed with interesting information on its processing . . . from the mining of bauxite, refining it to alumina, reducing the oxide to metal . . . right on through to the rolling of sheet, rod and bar . . . and the manufacture of fabricated parts.

This film, titled "A Recital of Faith," portrays the great advances in aluminum technology during the war years, and the infinite possibilities for aluminum in the post-war world.

Underlined is the part Reynolds Metals is prepared to play in co-operation with engineers and manufacturers who are now using, or plan to use aluminum, and the new lightweight, high-strength aluminum alloys.

o

Showings easily arranged

Every audience that has seen "A Recital of Faith" has praised it in glowing terms. It is now available, without charge, for showings before technical groups, engineering societies and manufacturers . . . 35 mm. or 16 mm.

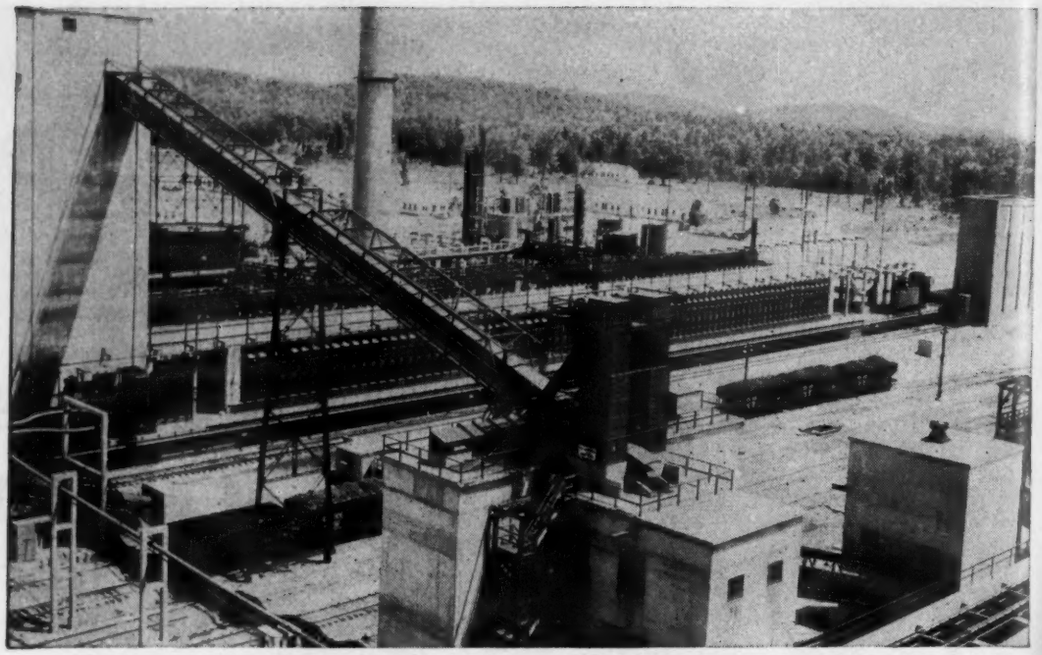
For full information, just write Reynolds Metals Company, Aluminum Division, 2500 South Third St., Louisville 1, Ky. On your letterhead, please.

REYNOLDS METALS

REYNOLDS ALUMINUM

The Great New Source of

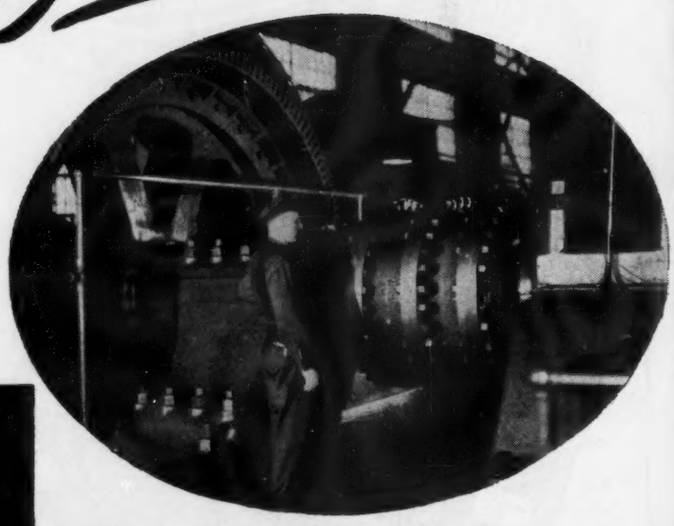
INGOT • SHEET • SHAPES • WIRE • ROD • TUBING • FORGINGS • CASTINGS • PARTS • FOIL • POWDER



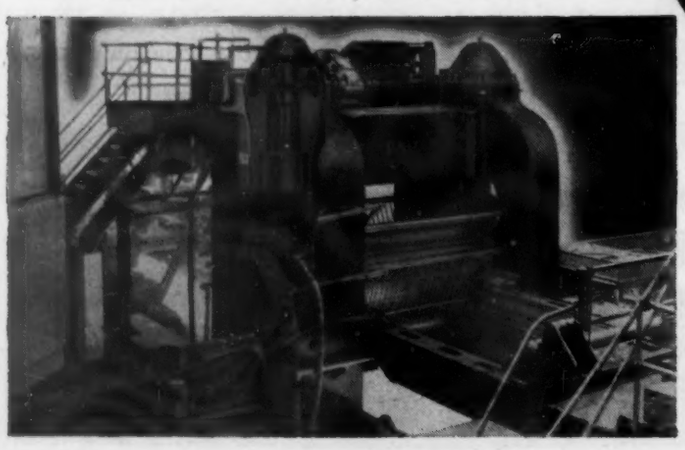
NEW COKE PRODUCTION FACILITIES AGGREGATE 12,500,000 TONS ANNUALLY—In four years of national emergency, America has built additional *new* steel production facilities nearly the size of England's prewar steel industry. Blast furnace output in America jumped from 56,500,000 tons in 1941 to over 67,000,000 tons now. That meant an added demand for almost 11,000,000 more tons of coke. This has largely been met by the building of new Koppers-Becker coke ovens since September, 1939, which annually produce approximately 12,500,000 tons of coke and billions of feet of gas.

KOPPERS

and the *Steel Industry*



UNEXCELLED WEAR RESISTANCE IN STEEL MILL PARTS—For the many parts of rolling mills and other equipment which must withstand terrific impacts in the rolling and shaping of steel, the steel industry uses a bronze alloy developed by Koppers Bartlett-Hayward Division. This D-H-S Bronze possesses the highest combination of three very desirable qualities . . . Ductility, plus Hardness, plus highest Strength.



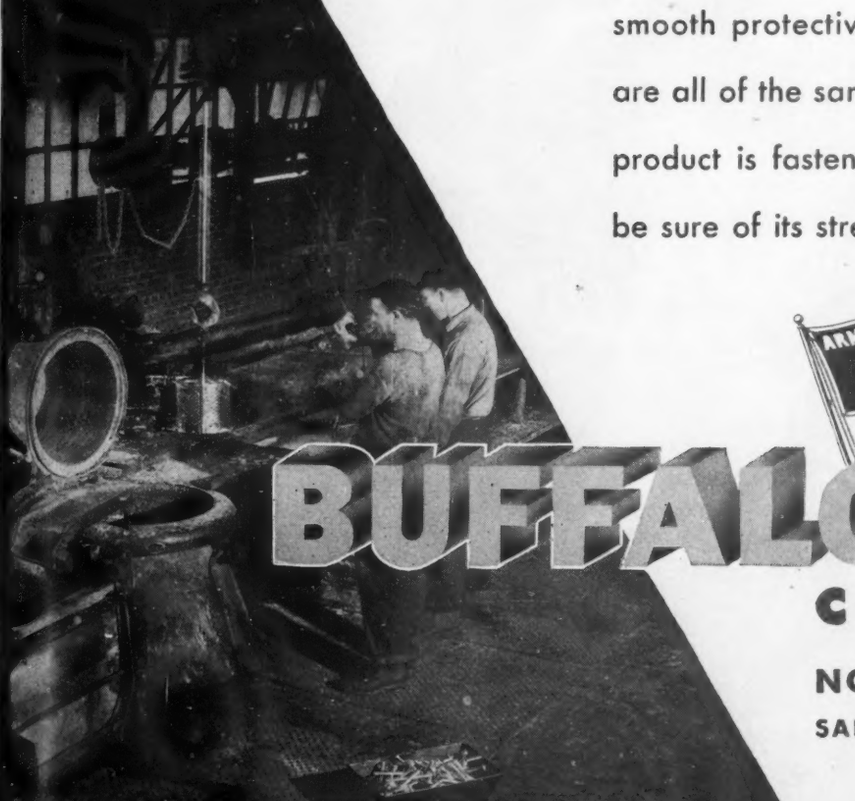
YEARS OF UNFAILING SERVICE THROUGH FAST'S COUPLINGS—Because a single coupling failure can shut down an entire rolling mill and other departments, dependability is of utmost importance. This picture shows the first large heavy-duty Fast's Coupling ever built, and today it is delivering 3000 HP at 135 RPM—more than 20 years after it was installed.

KOPPERS COMPANY, INC.

Koppers Building, Pittsburgh 19, Pa.

BROTHERS
under the skin

Select the finish you need; cadmium—lead—nickel —zinc—parkerized—galvanized. Beneath this smooth protective coating, Buffalo bolts and nuts are all of the same uniform quality. Whenever your product is fastened with a circle Ⓑ bolt, you can be sure of its strength and dependability.



A section of Buffalo Bolt Company's modern galvanizing department.

ARMY E NAVY

BUFFALO BOLT COMPANY

NORTH TONAWANDA, N. Y.

SALES OFFICES IN PRINCIPAL CITIES

BEWARE!

RUST

DON'T LET RUST RUN WILD IN YOUR PLANT

LIKE SOME TERRIBLE PLAGUE, rust spreads its ruin everywhere.

Annually this thieving demon costs American Industry more than a billion dollars!

Until recently, rust has been accepted as a necessary evil in many operations.

Today, thanks to new developments, various types of rust-preventive coatings and lubricating oils are obtainable.

SHELL ENSIS RUST-PREVENTIVE COATINGS

As protection against rain and snow during outdoor storage, or high humidity conditions *inside*, Shell offers a complete line of Shell Ensis Rust-Preventives. These oils, fluids, and compounds come in various grades, each designed to meet a specific condition. Protective coatings range from thin transparent coverings that need not be removed, to coatings that are able to resist extremes of weather over long periods of time.

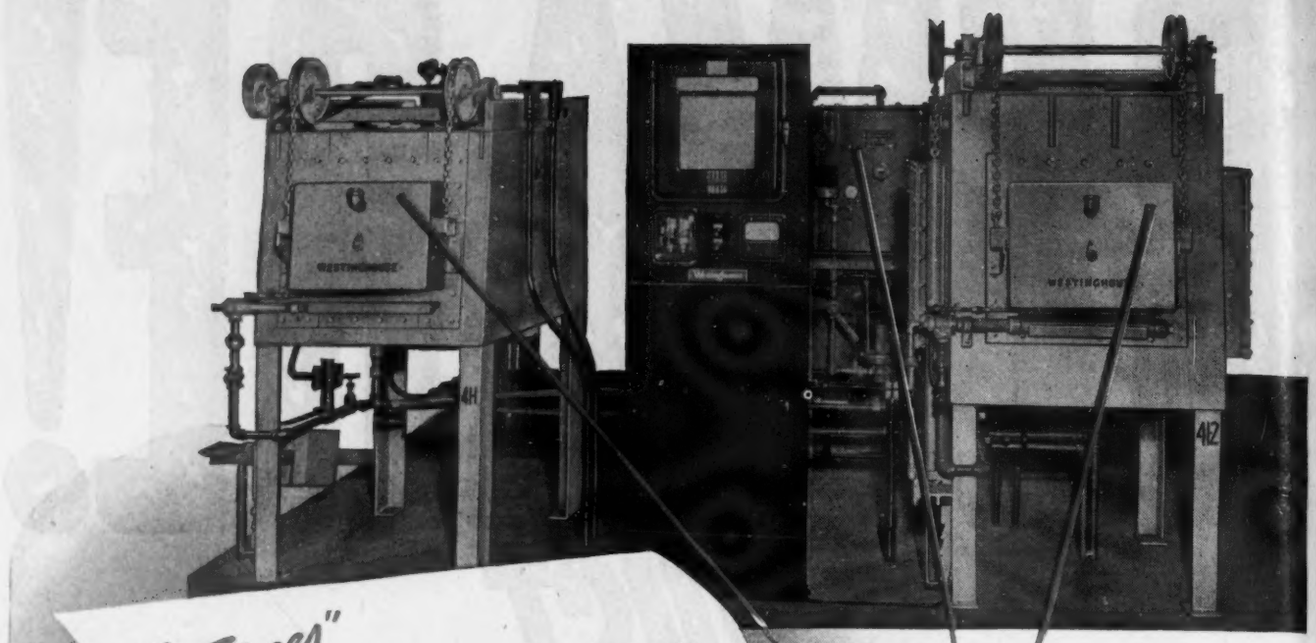
SHELL TELLUS RUST-PREVENTIVE LUBRICATING OILS

Where moisture is a factor, Shell Tellus Oils are recommended for machine lubrication. These scientifically developed oils cannot *remove* rust once it has started. But, because of special built-in rust inhibitors, they afford protection against the formation of rust—this without loss of lubrication qualities.

Call in the Shell man. He is a trained man, competent to study your operation and advise you. Let him show you how to keep rust out of your plant. Write, wire or phone—Shell Oil Company, Inc., 50 W. 50th St., New York 20, N. Y., or 100 Bush St., San Francisco 6, Calif.

SHELL

SHELL LUBRICANTS FOR EVERY INDUSTRIAL USE

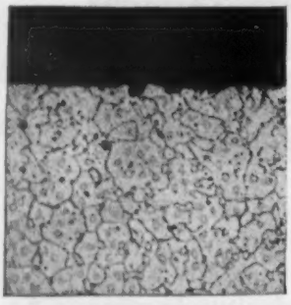


"Specs" FOR HARDENING HIGH-SPEED CUTTING TOOLS WITHOUT DECARB OR SCALE!

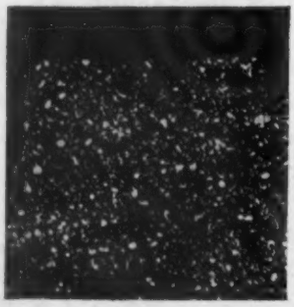
1 Westinghouse ENDOGAS ATMOSPHERE GENERATOR

2 Westinghouse TYPE HS FURNACE (Right)

At left, preheating furnace



PHOTOMICROGRAPH (X500) showing cutting edge of 8% molybdenum (Mo-Max Type) high-speed steel tool after quenching at 2230° F. Cutting edge is file-hard.



PHOTOMICROGRAPH (X500) shows Mo-Max Type high-speed steel tool after air tempering at 1025° F. Note the absence of decarb and the uniform distribution of the carbide particles clear out to the cutting edge.

Extremely sharp corners or cutting edges can't be retained on cutting tools if any decarb occurs or scale is formed in hardening.

Westinghouse Type HS Box Furnaces with Endogas atmosphere solve this problem. They permit hardening all types of high-speed steel—including moly, tungsten and cobalt—to file-hardness without decarburization. Sharp corners and edges stay sharp. No machining or grinding is necessary . . . cleaning costs are minimized.

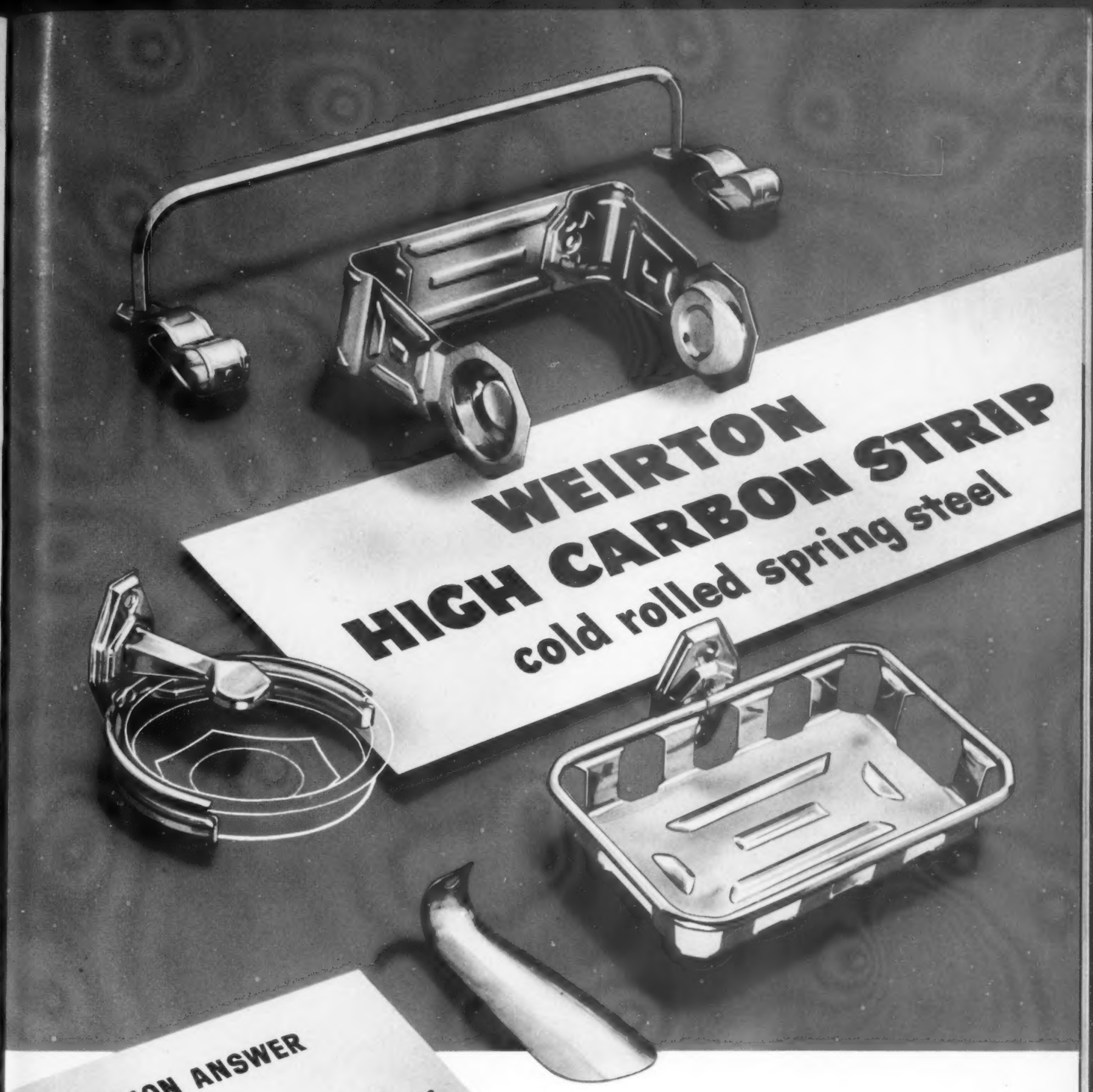
Rapid heating, low heat losses and low thermal capacity of the Type HS Furnace make it highly responsive . . . fast in operation. The Endogas generator includes automatic carbon pressure control. This permits maintaining an atmosphere in equilibrium with the steel to be treated, indefinitely and automatically. No interruptions for cleaning or repacking . . . no charcoal to replace.

Write for full information—ask for Bulletin D. B. 28-130. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

J-10266

Westinghouse COMPLETE HEAT-TREATING EQUIPMENT

PLANTS IN 25 CITIES... OFFICES EVERYWHERE



A PRECISION ANSWER to your fabricating problems WITH ...

1. Accurate response to heat treatment
2. Exceptional uniformity of gauge and width
3. Exact constancy of grain structure
4. Rigidly controlled chemical and physical properties
5. Record of performance in war-front products that assures a home-front preference

Write for test sample.

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WEIRTON, W. VA. *Sales Offices in Principal Cities*

Division of **NATIONAL STEEL CORPORATION** *Executive Offices, Pittsburgh, Pa.*

LOOK TO CARDOX

for cooperation in planning

MODERN FIRE PROTECTION

Let CARDOX Engineers help you analyze the fire protection needs of your post-war plants and manufacturing processes. Whether the hazards call for a fixed system, mobile equipment, or a combination of the two, Cardox protection, engineered and planned for the specific hazards it covers, provides for quick extinguishment with minimum damage to buildings and their contents.

Advantages of Cardox Engineered Fire Protection

Through Cardox methods of control and engineered application, a Cardox System extinguishes fires and cools out fire zones and combustibles by *mass* discharge at high rate of flow of *pounds* or *tons* of non-damaging, non-contaminating Cardox CO_2. Control may be fully automatic, manual, or a combination of the two. Automatic systems include actuation by heat detectors, pre-discharge alarm, release of doors and windows, shut down of fans and motors and essential related functions.

Uniform, Enhanced Extinguishing Performance

Carbon dioxide, one of the fastest of all fire extinguishing mediums, is given uniform, enhanced performance by the Cardox method of control and application. For example, Cardox CO_2 has uniform extinguishing characteristics regardless of plant or atmospheric temperatures; its high CO_2 snow yield provides increased cooling effect (carbon dioxide released at 0°F. yields 45% CO_2 snow); and, because of high CO_2 snow yield and special engineering of Cardox nozzle, accurate projection is achieved through relatively great distances.

Write on business letterhead for Bulletin 825 containing interesting data on modern fire protection through engineered applications of Cardox Fire Extinguishing Systems and mobile equipment of special interest to architects.

●

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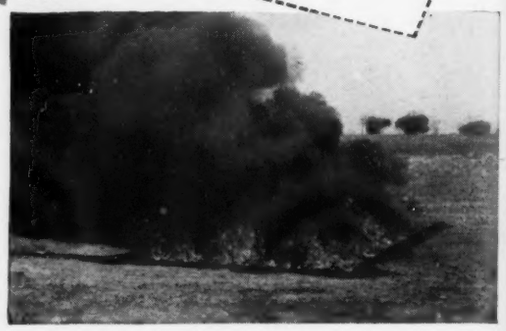
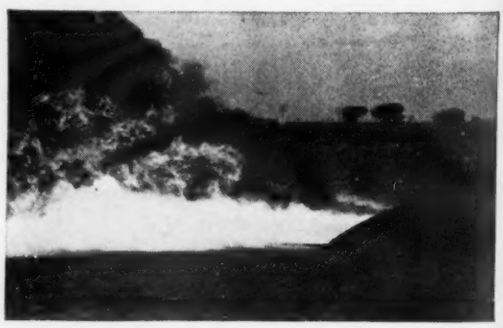
BUY WAR BONDS



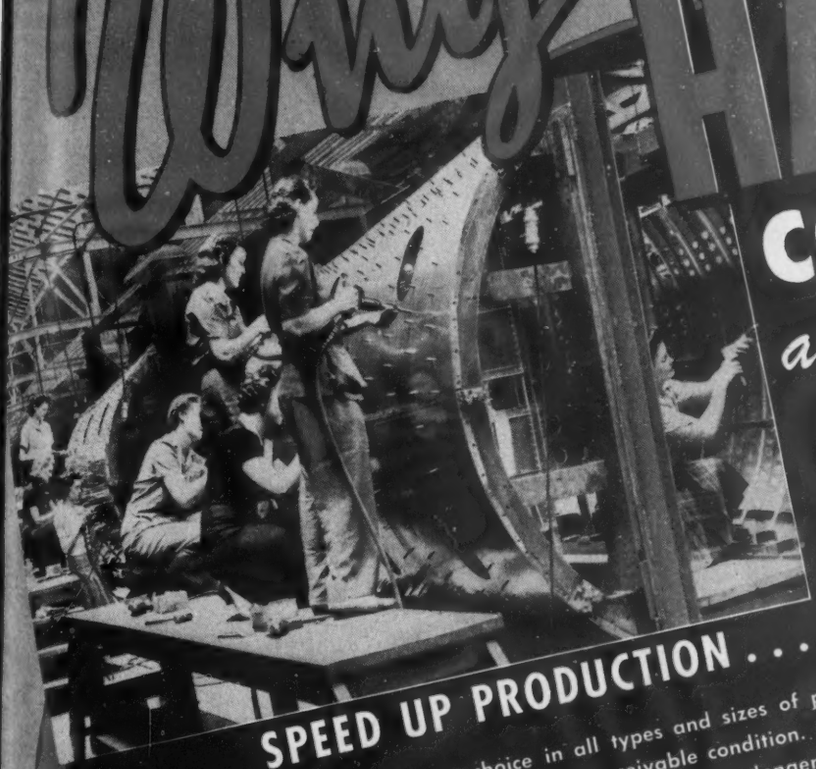
In this demonstration of the speed and efficiency of a Cardox Fire Extinguishing System under extreme conditions, 100 gallons of quenching oil, primed with gasoline, was allowed to burn long enough to develop maximum burning rate and heat.



At the height of the burning period a mass discharge of Cardox CO_2 was applied from fixed linear nozzles on two sides of the 10′x20′ test pool. Note in picture above how the mass discharge of Cardox CO_2 is enveloping the fire zone.

Complete extinguishment and cooling below re-ignition temperature was accomplished in total discharge time of 33 seconds. Note CO_2 snow on oil surface.

Why HANSEN COUPLINGS are so widely used



★

THEY'RE EASIER TO HANDLE, FASTER, LONGER LIFE, CUT DOWN COSTS

SPEED UP PRODUCTION . . .

Hansen Couplings are first choice in all types and sizes of plants throughout the world because of their remarkable performance under every conceivable condition. • Simplicity in design means faster and easier operation, greater production, less cost, less trouble, longer life. • Hansen Couplings will take pressures from 2 ounces to over 10,000 pounds without leaking. • They take rough treatment like a major because no parts are exposed, there's nothing to bend, jam or freeze. • Simplicity in operation is one Hansen feature that saves time, a lot of time. For instance, with a Hansen Air Coupling you merely push plug into socket, it is connected, locked and air is automatically turned on. To disconnect, merely slide sleeve back, it is unlocked, disconnected and air is automatically turned off.

There's a Hansen Coupling made for air, oil, grease, gasoline, oxygen and acetylene. Send in for free industrial catalog.

THE HANSEN MFG. CO.

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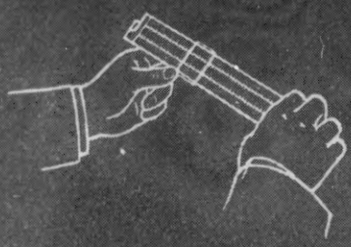
SEND FOR *Free* CATALOG

SPRINGS WITH Engineered PEP and POWER!



THERE'S many a mechanism today doing a *better* job—*longer*—because of specialized engineering principles applied to the springs. Automatic mechanical action calls for springs with the PEP to produce continued repetitive action, and the POWER to perform the desired function. Only sound engineering can provide *both* for individual performance requirements.

We have seen this in mechanical developments of the past. The unparalleled demands of this war have demonstrated it to a remarkable degree. Improvements and new devices to come will benefit from just such knowledge.

From now on, make sure you get the best mechanical action by using Barnes-made springs with *Engineered Pep and Power.*

WALLACE BARNES COMPANY DIVISION OF ASSOCIATED SPRING CORPORATION
BRISTOL, CONNECTICUT, U. S. A.

Corrosion Problems on Zinc or Cadmium Surfaces?

Test this free panel in your own laboratory and in your own way. See for yourself how IRIDITE will both PROTECT and BEAUTIFY your Products!

MAIL the coupon below for your free test panel of Iridite-protected zinc plating. Give it any corrosion test you want—and watch Iridite stand up. Then you'll know for yourself why Iridite is so widely specified as a corrosion-resistant final finish by Western Electric, Anaconda, Martin, Pyrene, Bulova and many other big-name manufacturers.

And remember, Iridite comes in a wide range of colors, giving products that added sales appeal which only attractive color can give. And all colors can be clear-lacquered for still greater durability!

Finally, in running your tests, bear in mind the quickness and simplicity of the Iridite process. Applied by brief dipping at normal shop temperatures, Iridite dries in a few seconds, permits immediate handling and shipping. No slow-down of fast-moving production lines working to fill war or civilian orders! That's why manufacturers all over the country specify Iridite for the zinc or cadmium surfaces of their present and future products!

Here's Why So Many Companies Use IRIDITE

Corrosion-Resistant. Iridite *unites chemically* with zinc or cadmium, forms a highly corrosion-resistant surface.

Attractive Colors. Currently available are blues, greens, maroons, bronze, olive drab and black. All can be clear-lacquered for still greater durability.

Firm Paint Base. Iridite holds paint permanently—prevents formation of that soapy, chalky under-layer that destroys adhesion.

Dimensions Unaltered. The Iridite process does not alter dimensions of the most finely machined or delicately articulated parts. Assemblies function as smoothly after Iridite treatment as before.

Completely Flexible. Iridited parts may be bent or twisted without flaking, chipping or peeling.

Easy to Apply. Iridite is applied by simple dipping immediately after the last rinse tank in the plating line. Parts dry in a few seconds, allowing immediate handling and shipping.

Use Coupon to Send For This Panel Today!

Half the test panel of zinc-plated steel has been treated with Iridite. Put the entire panel to any corrosion test you choose; then compare the two halves. You'll see for yourself why Iridite meets exacting military and industrial specifications—why you can't afford to go on the market with zinc or cadmium plated products that don't have Iridite's added protection and attractiveness!

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2. **Design suggestions**, resulting from hundreds of applications of permanent-mold-castings, to guide you in obtaining unusual savings available through the use of high strength aluminum alloys and lighter weight sections.
3. **Recommendations covering correct combinations of physical properties** required to meet given service conditions; and how to utilize the excellent physical properties and heat treatment potentialities of aluminum alloys to protect your product against failure.
4. **Estimates of cost-reducing possibilities** which may be realized through the use of permanent-mold-castings and metal from re-melt sources.
5. **Technical facts** resulting from comparisons of materials, processes, and costs usually overlooked and unappreciated except by those of broad specialized experience in the highly skilled art of permanent-mold-casting on a mass production basis.

Does your Future depend on the Use of Aluminum Alloys?

If you are looking ahead toward that bright and not so distant day when free enterprise will return to a competitive basis, maybe you'd better check up on the uses and merits of permanent-mold-castings through a Permold Engineering and Metallurgical Review, and get acquainted with things that point to a better and more prosperous future.

Permanent-mold-casting techniques utilize to the utmost the excellent physical properties and heat treatment potentialities of aluminum alloys.

High strength and light weight will be a tough team to beat in peacetime products. Permanent-mold-casting techniques develop, by the chill effect of the metal mold, the maximum strength and soundness inherent in aluminum alloys. Practically all of the high strength aluminum casting alloys can be utilized. This strength can be increased by heat treatment to a point that cannot be equalled by castings made by any other process. Higher strength, plus uniformity, in casting quality permits the use of a much lower factor of safety in designing; hence, lighter weight sections.

Lowest piece price for each part at the point of assembly is usually the result of: (1) Employing the correct permanent-mold-casting technique; (2) of taking advantage of the savings available through the use of metal from re-melt sources; (3) of a simple, straightforward design which permits a high rate of mass production with minimum scrap loss in machining and processing.

A Permold Engineering and Metallurgical Review will identify the *quality and cost reduction advantages of aluminum alloys in permanent-mold-castings for you.* To obtain the utmost of these advantages, designing must be done especially for permanent-mold-casting techniques.

Ask a Permold Engineer or Metallurgist to show you how to design for strength to meet a given service condition and to reduce cost at the point of assembly. He represents Permold's 24 years of venturesome technical and foundry experience.

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In the Cleveland Industrial Area

Here is the New Welding Publication that EVERY MAN interested in welding SHOULD READ

These features each month keep you posted on all developments and up-to-the-minute welding news

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- ★ WELDING DESIGN
- ★ PRODUCTION IDEAS
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..and here is WHY you should send for it TODAY!

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Welding at temperatures below the fusion point of base metals is made possible by employing the phenomenon of surface alloying. Joints welded with EUTECTIC *Low Temperature* Welding Rods are *smoother, stronger, better color matched* and *more machinable* than those obtainable *by any other welding or brazing process.*

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Please send me the latest issue of *The Eutectic Welder* and place my name on your regular mailing list.

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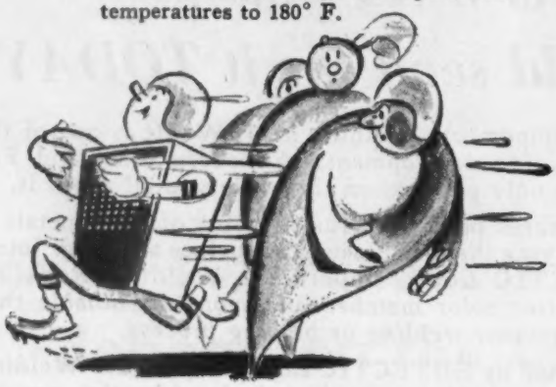
HERE'S ALLIS-CHALMERS' GREAT NEW V-Belt Team!

ALLIS-CHALMERS recommendations for belt selections are unbiased . . . because Texrope's V-belt lineup is *complete.* And as inventor of the multiple V-belt drive, A-C offers sound engineering help . . . backed by the world's longest experience in giving industry money-saving drives.

1 HEAT-RESISTING SUPER-7 has ability to withstand high ambient built right into it. Standard belt, it can operate in temperatures to 180° F.

2 OIL-RESISTING SUPER-7 is right for drives where fairly bad oil conditions prevail. Neoprene-covered, it resists oil spray and grease.



3 OIL-PROOF SUPER-7, is solid Neoprene—a synthetic unaffected by most rubber attacking liquids. Recommended for *extreme* oil conditions.

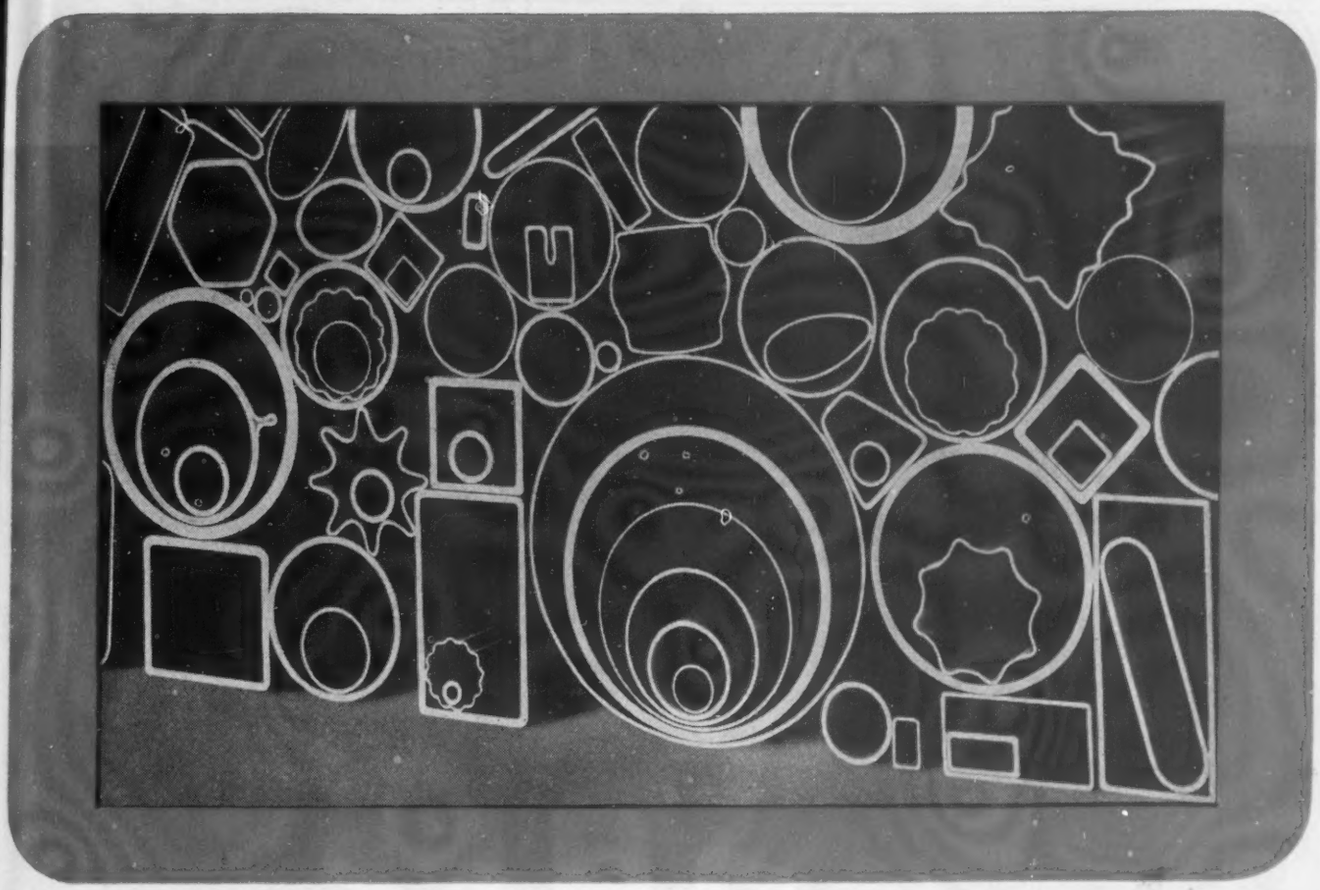
4 STATIC-RESISTING SUPER-7 *conducts* static charge to machine for grounding charge. This safety belt is applied where explosion danger exists.

5 SUPER-7-STEEL employs endless steel cables to provide greater strength, reduce belt stretch. It is ideal for driving extra-heavy loads.

A 1732

IT PAYS TO MAKE ALLIS-CHALMERS YOUR V-BELT DRIVE HEADQUARTERS

Texrope Super-7 V-Belts result from the cooperative research of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by A-C.



IMPROVE QUALITY—SPEED FABRICATION—CUT COSTS with *Republic* ELECTRUNITE TUBING

Republic ELECTRUNITE Tubing provides the high strength to weight ratio of a tubular section, the flexibility of tubing as a design medium and the low cost of a hollow member as compared with that of a solid bar.

To these inherent qualities of tubing, however, should be added the 10 advantages of the ELECTRUNITE PROCESS listed at the right. These are the features which mean improved quality, speedy fabrication and low production costs.

Republic ELECTRUNITE Tubing can be made in a wide range of analyses, shapes and sizes. Analyses include carbon, rail steel and stainless steel grades. Shapes which have been produced are illustrated above. Sizes up to 5″ O.D. round; other shapes in comparable sizes.

Republic engineers and metallurgists have gained wide experience through pioneering the electric resistance welding process and the production of more than a billion feet of tubing for countless purposes. This knowledge is yours to help you plan future products to sell at a profit in competitive markets. Tell us what you expect to make, and we'll tell you what ELECTRUNITE can do for you.

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7. SMOOTH, SCALE-FREE SURFACE
8. UNIFORM WELDABILITY
9. UNIFORM WORKABILITY
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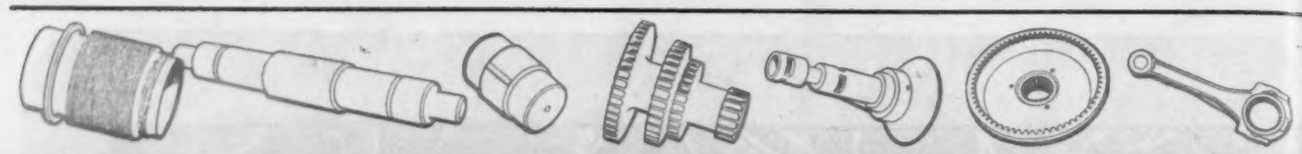
BE CAREFUL WHEN YOU DISCUSS WAR INFORMATION. THINK BEFORE YOU SPEAK.

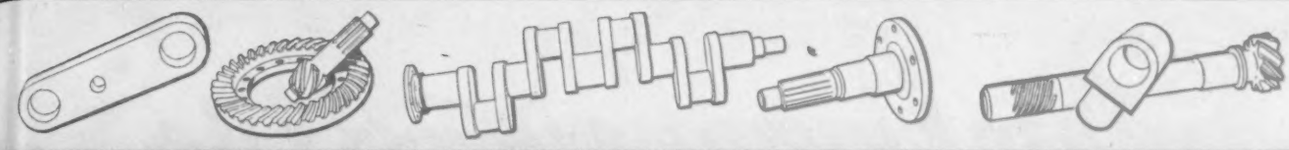
Republic
ELECTRUNITE®
® Reg. U. S. Pat. Off.
MECHANICAL, AIRCRAFT AND PRESSURE TUBING



NITRALLOY

FOR PARTS . . .

- that must have high surface hardness and wear-resistance
- that must retain hardness at elevated temperatures
- that require high resistance to fatigue



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SHEETS
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In all commercial sizes

WE are in excellent position to furnish the complete line of special alloy steels most suitable for case hardening by nitriding.

These Nitralloy Steels are produced both in our Chicago and Pittsburgh mills. Our metallurgists will gladly discuss their application in terms of your requirements.

(If you are not equipped to handle nitriding in your own plants we will gladly tell you what firms in your vicinity are qualified to do this work for you.)

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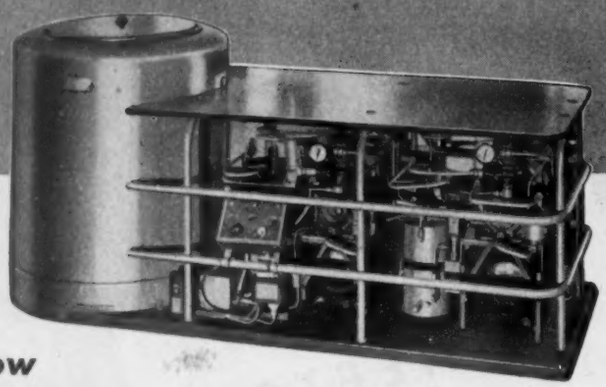
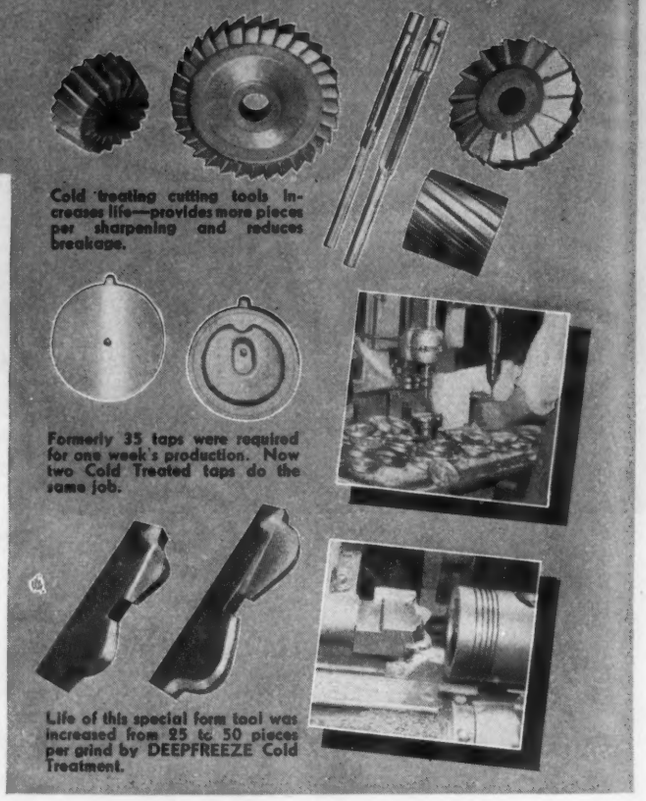
USS STEEL
UNITED STATES STEEL

UNITED STATES STEEL

3 to 1 increase in Tool Life by Cold Treating in a Deepfreeze Industrial Chilling Machine....





Cold treating cutting tools increases life—provides more pieces per sharpening and reduces breakage.

Formerly 35 taps were required for one week's production. Now two Cold Treated taps do the same job.

Life of this special form tool was increased from 25 to 50 pieces per grind by DEEPFREEZE Cold Treatment.

How this Manufacturer Improves Machining Efficiency by Cold Treating All Types of Cutting Tools Used in the Plant

This report shows how a large mid-western manufacturer tripled tool life, improved efficiency of machining operations and minimized machine down time by instituting a plant-wide program of cold treating all high-speed steel cutting tools.

Greater Tool Economy By Cold Treating

Prior to cold treating, frequent sharpening and breakage were common. It was therefore decided to subject a few tools to cold treatment. Results were outstanding; life of taps was increased in the ratio of 15 to 1 and special form tools 2 to 1.

This manufacturer now subjects all high-speed steel metal cutting tools to cold treatment in a Deepfreeze Industrial Chilling Machine before putting them into service. Here are the overall results—life of all tools is increased in the ratio of 3 to 1 with considerably less breakage, and a resulting decrease in machine down time. Efficiency of all machining operations is greatly improved.

Cold Treating Has Many Valuable Applications

The utility of cold treating is not limited to the treatment of cutting tools. It is employed with equally outstanding results for the following purposes: shrinking metal and shrink-fit assembly; stabilization of gauges and machine parts; testing of instruments and materials.

How Deepfreeze Engineering Service Can Help You

Our pioneering and extensive experience in the field of cold treating enables us to analyze your requirements and show how cold treating can be applied to your production. This service is offered without cost or obligation.

FREE...TREATISE ON COLD TREATING PROCEDURES

This 48-page Deepfreeze Technical Data Bulletin contains valuable information on Cold Treating Methods, procedures and results obtained by many of the nation's leading manufacturers. Also included are specifications on standard models of Deepfreeze Industrial Chilling Machines. Write today for your copy of this valuable Bulletin No. I-4.

Only Motor Products can make a "DEEPFREEZE"

Deepfreeze

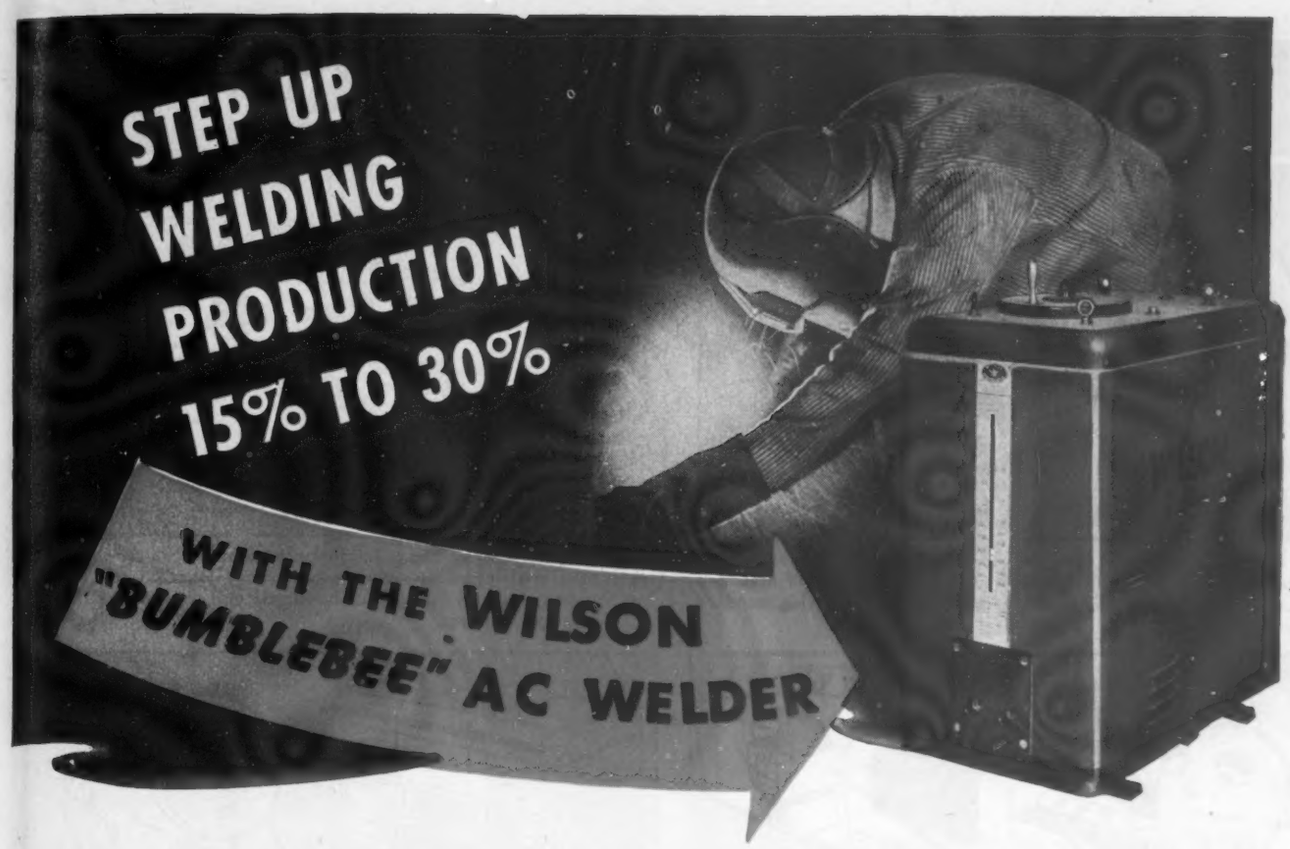
TRADE MARK DEEPFREEZE REGISTERED UNITED STATES PATENT OFFICE

Industrial Chilling Equipment for Shrinking, Testing, Hardening and Stabilizing Metals

2309 DAVIS STREET, NORTH CHICAGO, ILLINOIS

DIVISION OF
MOTOR PRODUCTS CORPORATION
DETROIT, MICHIGAN

STEP UP WELDING PRODUCTION 15% TO 30%



WITH THE WILSON "BUMBLEBEE" AC WELDER

Here's the machine that will give you more welding production per work day with considerably less power. It's a sturdy, reliable A. C. welder that provides 15% to 30% *increased* welding production, with 30% to 35% *less* power consumption than equivalent D.C. machines.

NOTE THESE OUTSTANDING FEATURES:

Wide Current Range of 60 to 375 amps. (for 300 amp. "Bumblebee"), and 100 to 625 amps. (for 500 amp. machine).

Improved Electrical Efficiency at rated load of 81% and 83%, for 300 and 500 ampere sizes respectively.

Minimum "arc-blow" increases welding production and makes for easier operation.

Better Power Factor with built-in capacitors helps reduce power costs and relieves loaded power lines.

Maintenance Practically Eliminated because there are no heavy rotating parts.

POWER SOURCE FOR AUTOMATIC WELDING HEADS. 300 ampere and 500 ampere "Bumblebee" machines also are excellent transformers for use with automatic welding units. Connected in parallel they provide ample power, and also permit unusual flexibility in welding operations.

ALSO MADE IN "ALL-WEATHER" MODELS

"All-Weather" models of the "Bumblebee" have these extra features: (1) Moisture-proof insulation, throughout. (2) All parts are protected by moisture-proof paint. (3) Sturdy weather-proof case is finished in durable outdoor enamel, and has gaskets and louvers designed to exclude rain, sleet, snow. (4) Special low voltage contactor automatically reduces open circuit voltage to about 40 volts.

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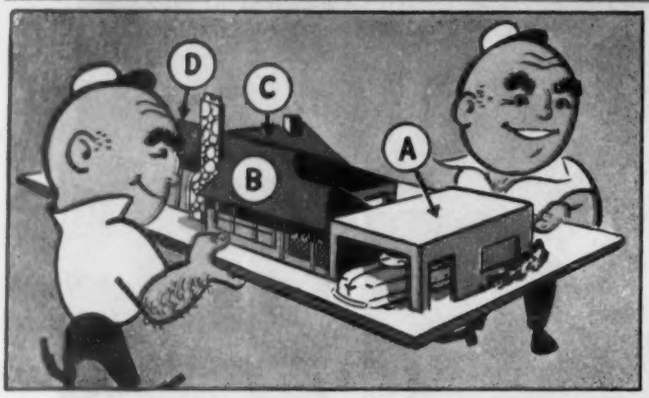
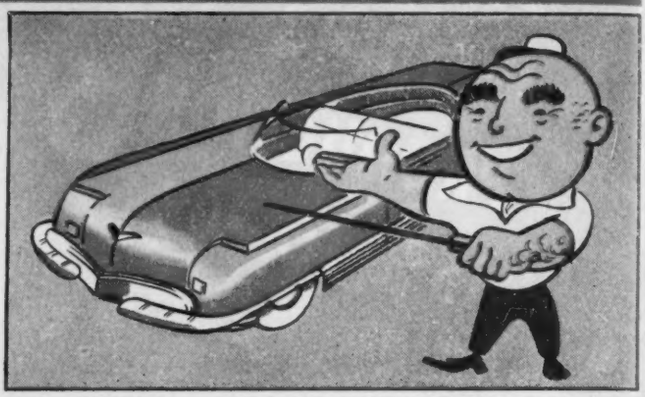
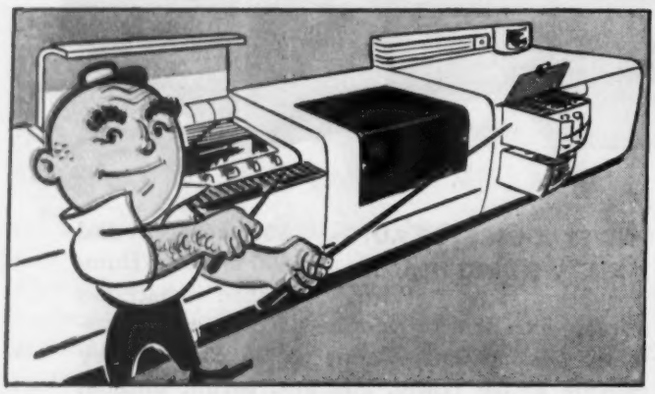
BUNDYWELD IN EVERY HOME



THE MODERN American home is served with many appliances and conveniences equipped with Bundy steel tubing . . . appliances and conveniences which give the American family the highest living standard in the world.



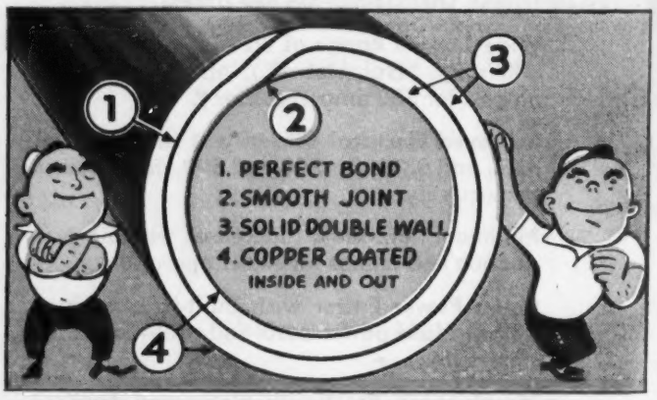
A The family car (and incidentally most trucks on the road, too) may have an average of twenty Bundyweld parts—fuel lines, oil lines, brakes tubes, and many miscellaneous small parts.



B In the kitchen, the gas range probably has flash tubes, pilot lines, and connecting tubes of Bundyweld. And for the electric refrigerator's condenser, Bundyweld is pretty much standard throughout the entire industry.

C Wherever the food freezing and storage unit may be—basement, utility room, or a complete separate room, it, too, may have many Bundyweld Tubing parts similar to those in the electric refrigerator.

D Water and space heating units are apt to use Bundyweld for pilot lines, connector and feeder tubes—in fact anywhere a tube in Bundy's range of sizes is required.



ALL THESE USES are not just accidental. They are because industry recognizes that the solid, double wall construction of Bundyweld—an exclusive Bundy feature—meets every test for superior performance.

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ENGINEERED TO YOUR EXPECTATIONS

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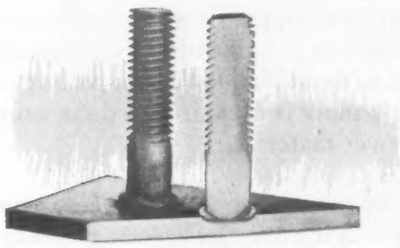
★ **One operator can weld more than 1000 studs a shift. No previous welding experience is necessary.**

★ **Thousands of guns are now in use in more than 500 shipyards and industrial plants.**

The Nelson Stud Welder is simple to use. All welding is automatically controlled. The tool is completely portable, or may be operated from a fixed jig.



Cutaway view of a stud weld (after etching with Nital) shows the complete fusion of the stud to metal . . . the result of complete shielding of the arc, accurate arc timing, and the use of "flux-filled" studs.

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Scoop Competition WITH UNICHROME* Alkaline Copper

THE PROCESS THAT STEPS UP PLATING OUTPUT OF SMOOTH, DUCTILE DEPOSITS

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Unichrome Copper deposits are exceptionally smooth and lustrous . . . provide an excellent base for bright nickel without buffing. When plating over rough base metal, buffing is done in less time, using less pressure and fewer materials.

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Send for this Descriptive Leaflet

It gives all the advantages of Unichrome Alkaline Copper . . . as well as characteristics . . . plating speed tables . . . important technical data. Kindly outline your needs to assist us in answering more fully.

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☆**UCILON** — a corrosion-resistant coating for protecting surfaces against acids, alkalies, water, gasoline and various corrosive chemicals.

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Simple is the word for the *Simplimatics*

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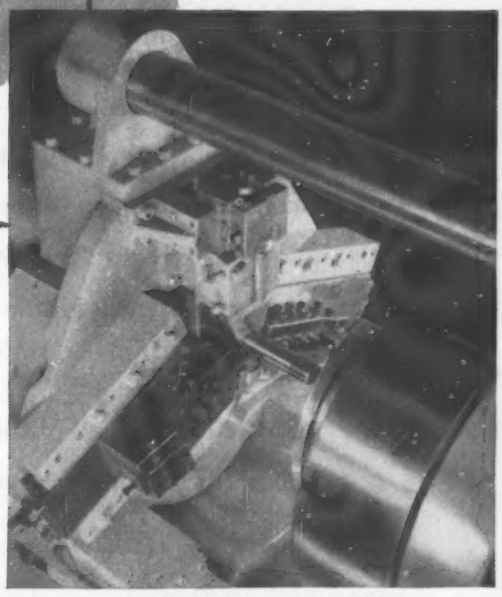

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2. **The wide variety of tool arrangements on the large flat table of the Platen-Type Simplimatic (shown above) makes it adaptable to a wide range of work.**
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Rodine
★NOTE: In Continuous Strip Pickling, RODINE is found valuable as a safeguard, preventing over pickling even when the strip comes to rest in the solution during interruption to operation.

Makes Possible, WITH SAFETY, *Faster Production and Increased Actual Tonnage Yield of Pickled Steel*

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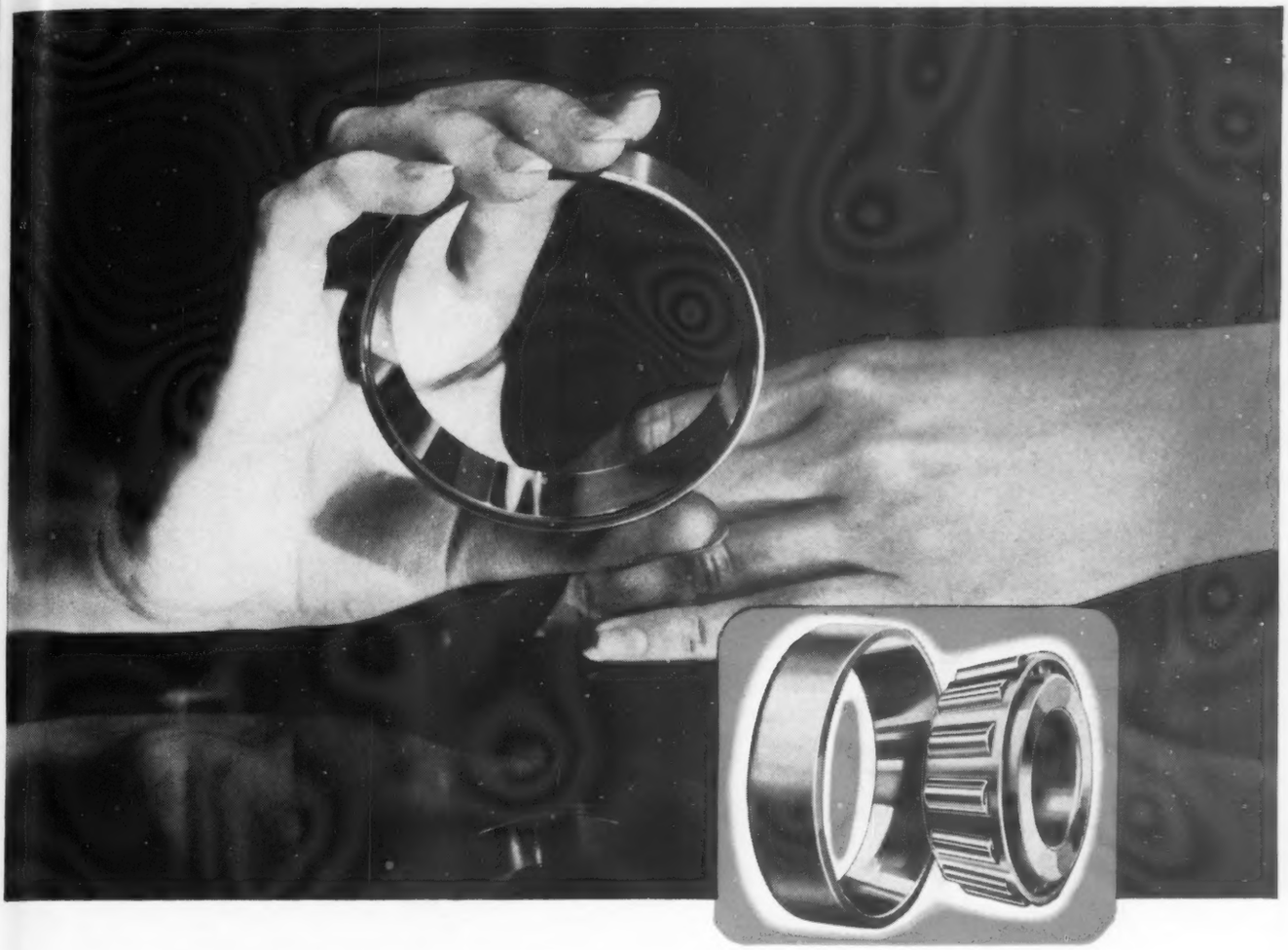
Note—West Coast Plants may address inquiries and orders for prompt delivery to Leon Finch, Ltd., 728 East 59th St., Los Angeles, California.



A Race Track *Smoother than a Mirror*

It's the cup—the outer race or roll track—of a high-precision roller bearing. And it's made from Republic Electric Furnace Steel—because the manufacturer insists upon the finest steel his money can buy.

Top quality is one reason. Anti-friction bearings must be uniformly high in strength to resist tremendous strains—high in hardness to resist wear.

But there's another reason—a very important one. In the manufacture of these cups, more than 20 individual operations are climaxed by honing to a smoothness of approximately 3 micro-inches (3/1,000,000ths of an inch). Hence the steel must be free from minute imperfections to insure against rejection at final inspection—loss of material and labor—excessive manufacturing costs.

Republic Electric Furnace Steels are as CLEAN and SOUND as the most modern furnace practice and longest experience can make them. They're consistently UNIFORM, too—in physical, chemical, hardenability and performance values. And because they are homogeneous and free from practice-upsetting variables, they enable manufacturers to derive the greatest possible benefits from mass production.

By using Republic Electric Furnace Steels, engineers can predetermine product quality—because the close control possible only in electric furnace melting permits accurate "targeting" to narrowest specifications.

Today, these fine steels are helping to make possible the world's finest fighting machines—helping to achieve miracles in performance and production. Tomorrow, they will help manufacturers of peacetime goods to offer customers more for their money. Why not prepare for tomorrow NOW by learning just how Republic Electric Furnace Steels can help YOU?

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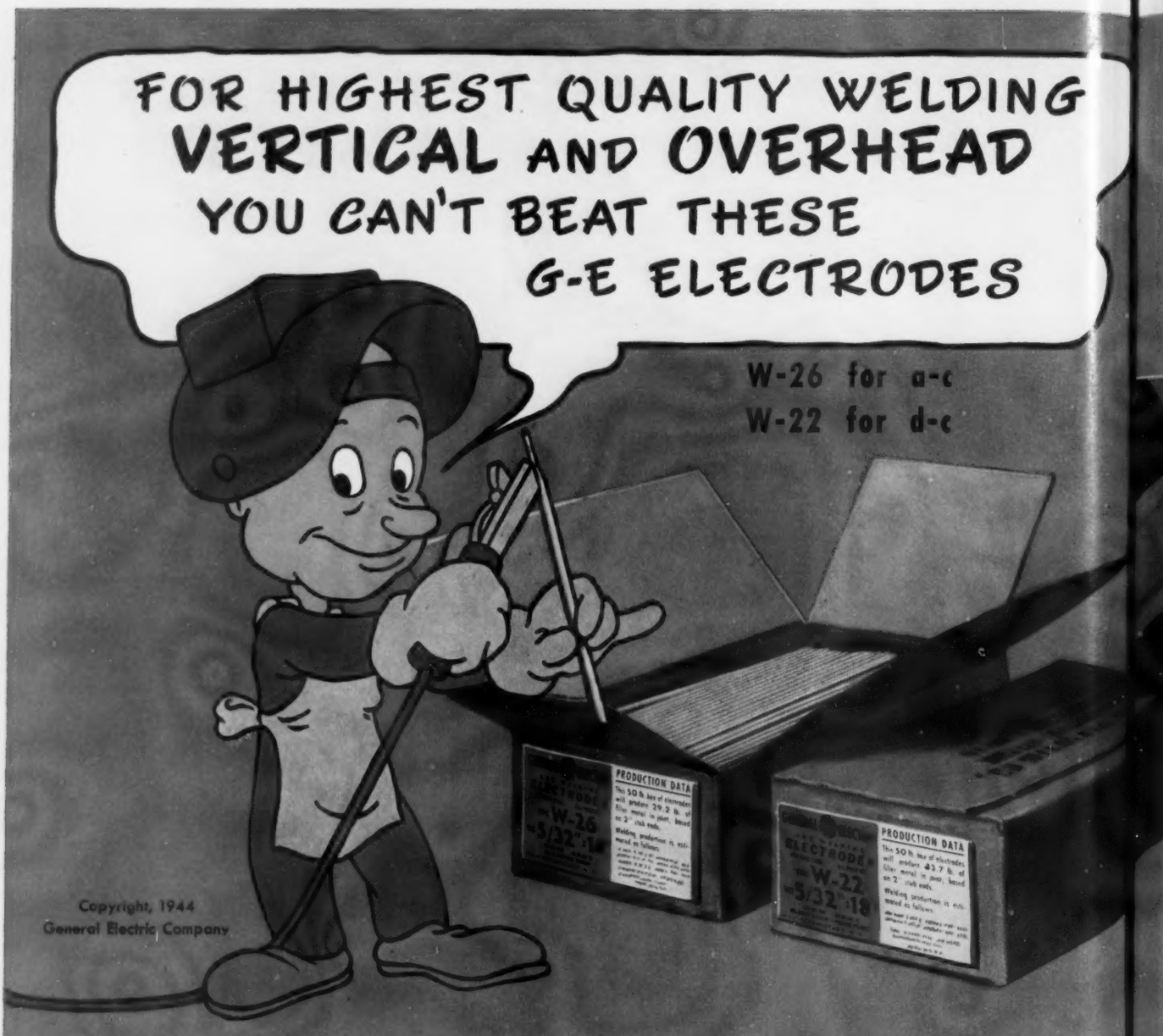


YOU can't afford to compromise when choosing electrodes for first-class welding in the vertical or overhead position, because that kind of welding calls for the *best* in both technique and electrodes. That's why operators prefer these two G-E electrodes--they find them mighty helpful in meeting specifications.

W-26 electrode is recommended for use with *a-c;* easily meets *all* the requirements of A.W.S. Class E6011. It is approved by regulating bodies for both E6011 and E6010. (Therefore it can also be used for d-c.)

W-22 electrode is recommended exclusively for use with *d-c*. It meets *all* the requirements of A.W.S. Class E6010, and is approved accordingly.

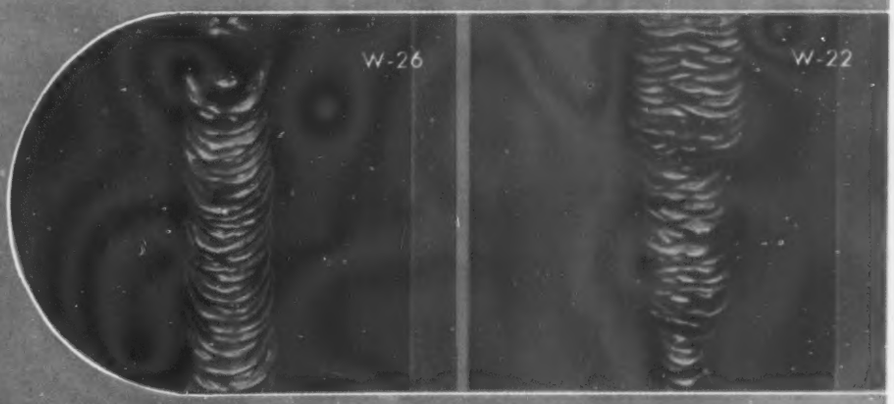
Both electrodes produce weld metal which has the *highest* mechanical properties. And both are *easy* to use. They provide a forceful, digging type of arc which gives deep penetration, excellent fusion, and a strong, ductile deposit in all positions. Slag is light and easy to remove. Fillet welds have good appearance and a relatively flat profile.

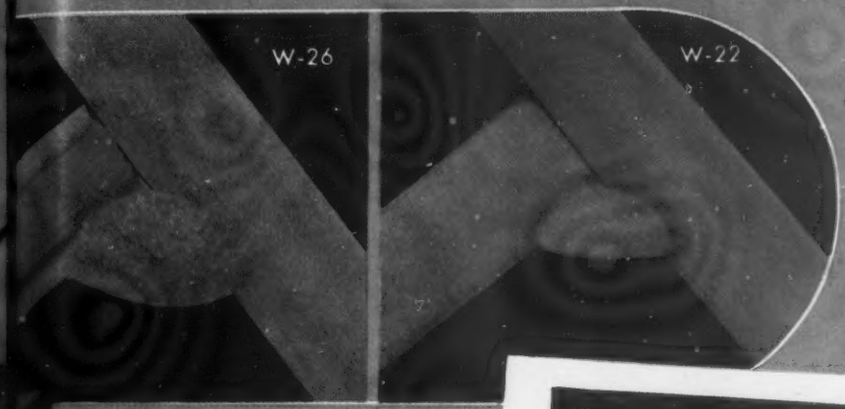
If you are not one of the thousands already using these production proved electrodes, it will pay you to ask your G-E arc-welding distributor for samples to test in your own shop. He will also be glad to furnish samples and information about other G-E electrodes. Or, write to General Electric, Schenectady 5, N. Y.

GENERAL ELECTRIC

673-55-8750

● **Surface appearance** of welds made in the vertical position with both the W-26 and the W-22 electrode is unusually good. Both these electrodes can also be used in the overhead, horizontal, and flat positions with equally good results.





● **Excellent penetration,** good fusion, and flat contour are easily obtained with both W-26 and W-22 electrodes. These etched cross sections of welds made in the vertical position are typical of results obtained with these electrodes.

Hundreds of Landing Barges have been fabricated with General Electric a-c welders and W-26 electrodes at the Trageser Copper Works, Maspeth, L. I., N. Y.

ANOTHER User Tells Why He Prefers A-C Welding

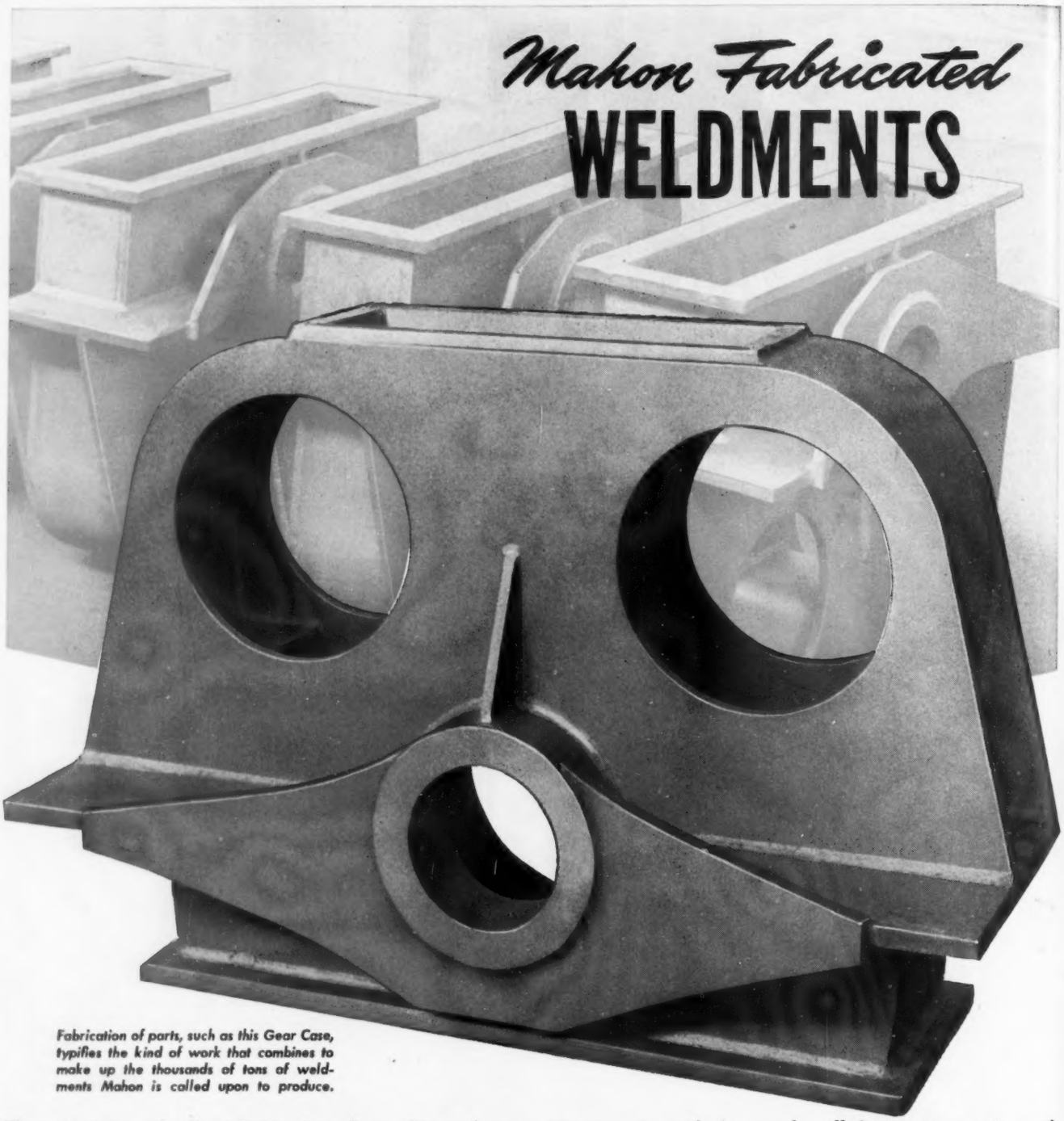
"Our operators prefer a-c welders because, with a-c, they don't have to worry about arc blow — they can weld in every position and in every location and get a good strong joint every time. What's more, our General Electric a-c welders have been operating 20 hours a day, six days a week, for more than two years, and not one has ever required maintenance."

TRAGESER COPPER WORKS

That statement is typical of comments made by virtually every manufacturer who has changed from d-c to General Electric a-c welders. For full details on how a-c welding can help you improve weld quality, increase production, and reduce costs, ask for Bulletin GEA-4081. Simply contact your G-E arc-welding distributor or write to General Electric Company, Schenectady 5, N. Y.

ARC WELDING ELECTRODES and EQUIPMENT

Buy all the BONDS you can —and keep all you buy



Mahon Fabricated WELDMENTS

Fabrication of parts, such as this Gear Case, typifies the kind of work that combines to make up the thousands of tons of weldments Mahon is called upon to produce.

The attention of all industry has been focused on WELDED STEEL PLATE CONSTRUCTION in the fabrication of implements of war—a condition that is certain to carry over into the manufacture of peacetime parts and products.

The advantages are manifold. WELDED STEEL PLATE is stronger and lighter. It requires less machining and finishing. It eliminates pattern expense and reduces scrap. It is non-porous. It presents a smoother, finer, appearance and, in nearly all instances, parts and products can be produced in quicker time—at a very attractive cost.

Supplementing the extensive production facilities available at Mahon is a staff of experienced design engineers. These men are prepared to give you exact and complete information in adapting your product to the advantages of WELDED STEEL PLATE CONSTRUCTION. They will also assist you in its re-design if that should be required.

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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 116. NO. 7 FEBRUARY 12, 1945

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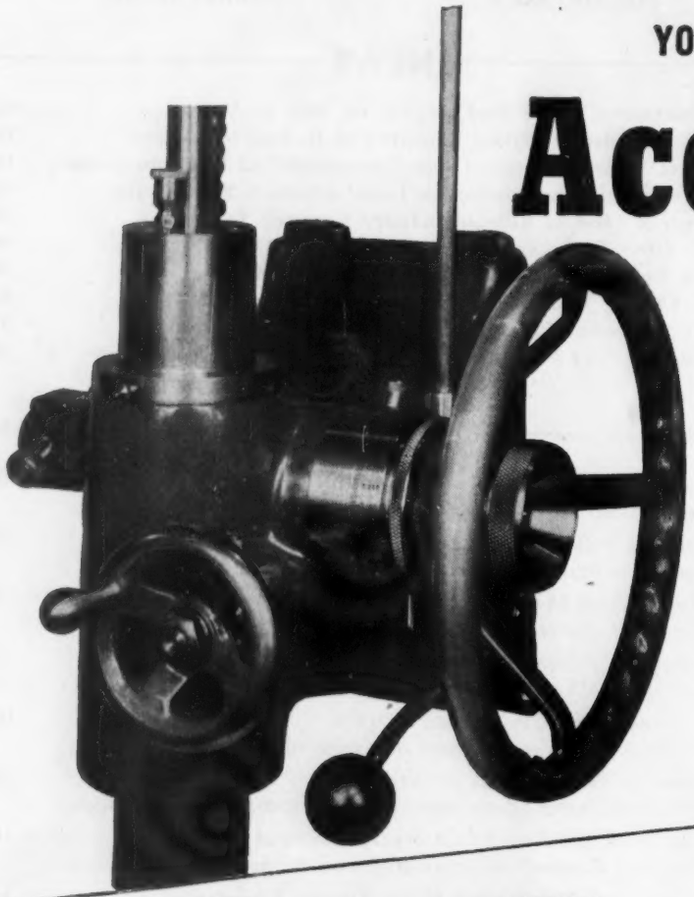
YOUR MACHINE TOOL OPERATING

Accuracy...



Minimize Thermal-Induced Error by Use of Low Expansion Alloy

SECURE INCREASED PRODUCTION

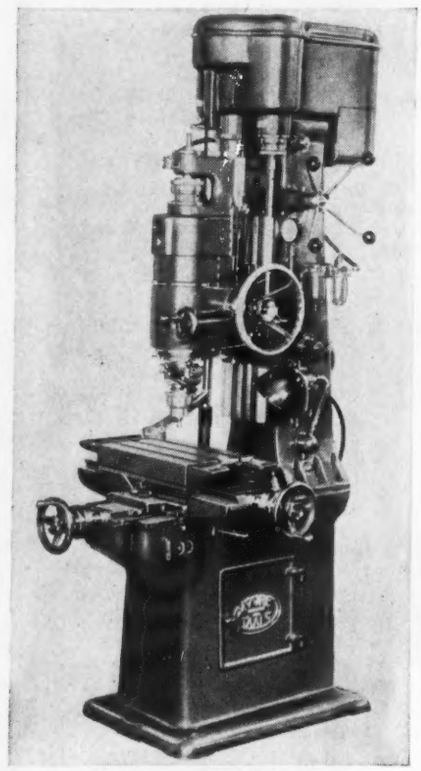
Competitive conditions increase the value of units that provide high accuracy and output.

But accuracy and output fall sharply when temperature changes, even though slight, cause troublesome dimensional changes in castings such as spindle housings. For example, in jig borers and grinders, as much as .0003" to .0005" change in spindle location has been caused by expansion and contraction of housings.

Such deviations reduce output . . . imposing need for warm-up before jobs can be set . . . requiring constant readjustment during operations.

Thermal-induced error can be reduced to a negligible minimum . . . with Type 6 Ni-Resist . . . commonly termed "Invar Iron". Castings of this low expansion alloy, containing 36% Nickel, have proved successful even under very wide temperature changes.

We invite consultation on the use of Nickel Cast Irons and other alloys containing Nickel. Send us details of your problems for our recommendations.



Moore Jig Grinder with Spindle Housing of Low Expansion "Ni-Resist".

Here's what J. R. Moore* says about Type 6 Ni-Resist:

"Since we started using 'Invar Iron' . . . we have found that we have been able to virtually eliminate the warming-up periods previously required to make accurate settings or determine accurate locations. The overall efficiency of these two machines is probably increased by at least 20% and no difficulty on this score has since been encountered by users. This is an important factor, particularly in the use of machines intended to work within tolerances of ten-thousands of an inch."

*Production Manager and Secretary of the Moore Special Tool Company, Inc., Bridgeport, Conn.

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall Street, New York 5, N. Y.*

STEEL
February 12, 1945

Why Another Feud?

Action of the Senate in voting 74 to 12 to divorce the lending agencies from the Department of Commerce and postponing until March 1 the date when the appointment of Henry Wallace can be voted upon throws the controversy open to prolonged debate. In the ensuing airing of the pros and cons, there is danger that American industry will be placed in a false and unfair position before the eyes of the public.

This danger stems from an unfortunate remark made by Mr. Wallace to the Senate Commerce Committee. He said that the chief issue is whether government loans should be used "only to help big business or whether these powers are also to be used to help little business and to help carry out the President's commitment of 60,000,000 jobs." This statement, voiced before the Senate had voted to remove the lending agencies from the department, indicates the Wallace frame of mind. He would array little business against big business, just as since 1933 he has promoted feuds between employes and employers and between the "have nots" and the "haves."

As a result, press commentators are beginning to tell the public that Mr. Wallace will crusade to defend small business from the oppression of big business—that Wallace favors pumping loans into small business from the bottom as opposed to Jesse Jones' program of pumping aid into the top and letting it trickle to the bottom.

These attempts to define the real issue stem from the fallacious premise that the chief threat to small business is oppression by big business. This is not so and the most convincing way to prove it is to go to small businessmen and ask them what are the principal menaces confronting them.

Their answers, in order of importance are these: 1. Discrimination, bluffing, intimidation, persecution and time-consuming annoyances by agencies of the federal government. 2. Undue conflict between labor and management, greatly aggravated by government back-seat driving. 3. Oppression resulting from monopolistic practices.

What this nation needs in the Department of Commerce is not a man who will array small business against big business. Instead it needs a man who knows the legitimate functions of large and small businesses and will fairly promote opportunities for both, who will protect both against monopoly and who will stand up for business against demoralizing brow-beating by an already too-powerful government bureaucracy.

Mr. Wallace is not that man.

WAIT FOR THE COUNT: Decision to shift armed forces from the European to the Asiatic theater of war after the defeat of the Nazis and to re-equip the transferred troops from the United States may cause drastic revisions in the volume and timing of war production at home.

Certainly this stroke of strategy knocks into a cocked hat the once prevalent notion that the war program could be trimmed as much as 40 per cent after Germany falls. However, there still remain too many unknown factors to permit of inflexible assumptions. Authorities are amazed at the weak resistance of Japan in the Philippines and are wondering if the Japs may not be weakening faster than was anticipated. Likewise there still is a possibility that Germany, despite her desperate plight, may stage an effective delaying action.

The point is that while the decision to re-equip the augmented Asiatic forces will call for an expanding war production, the timing of the defeats of Germany and Japan will be the controlling factor. Not knowing when these events will occur, we will

(OVER)

do well to keep production up to capacity until one or both victories gives us the signal to relax.

We must not repeat the mistake of last September. Wait for the count of ten. —p. 61

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PRESTO! A BRIDGE: One of the marvels of the Allied progress toward victory is the speed with which army engineers have been able to replace wrecked bridges. Credit for this must be divided three ways—to the engineers for their skill and courage under trying circumstances, to the British who conceived the idea of unit construction and to British and American steel fabricators whose construction of bridge members to tolerances close enough to permit complete interchangeability has made the idea practicable.

Chord members are welded in the shop and shipped in 15 and 20 foot lengths for field assembly with drift pins and bolts into spans ranging from 55 to 85 feet. Holes are centered and drift pins are machined to such close tolerances that even if individual bridge units are fabricated in widely separated shops they will fit perfectly.

Chord sections may be used as top or bottom chords and—in common with diagonals and verticals—can be turned end for end. This flexibility is a great advantage. —p. 92

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LOWDOWN ON JOBS: When it comes to doping out postwar jobs for the jobseekers, no state has a problem comparable with that which confronts California. Thousands responded to the call of the state's war-born ship and airplane activities and many of them wish to make the Golden state their permanent home.

Recognizing this unusual situation, the California State Reconstruction and Re-employment Commission undertook an exhaustive study of the postwar employment problem. It figures that under the most promising circumstances about 3,200,000 jobs will be available in the first year following demobilization. If unusual difficulties are encountered during the transitional period, the number of jobs may not exceed 2,800,000. On the basis of these estimates and taking into account the probable number of persons deserving jobs, the commission foresees a jobless army of from 450,000 to 800,000 persons.

We commend the California fact-finding formula to other areas. Survey the job situation realistically and plan accordingly. —p. 83

ONE GOOD WAY OUT: Disclosure that the United States Steel Corp. is interested in buying or leasing the Geneva properties in Utah and the intimation that it might also consider acquisition of the Kaiser furnaces and mills at Fontana afford ground for interesting speculation.

Because of their size and location, the ultimate disposition of these government-owned works is extremely important. As long as the government holds title to them, strong pressure will be brought by various factions for the government to operate or subsidize them.

On the other hand, if the properties were bought or leased by private interests, the complications of public ownership or subsidy would be avoided. Also, if the purchasers or lessees were to utilize the new capacity to replace abandoned less efficient capacity, the deal would cause less economic disturbance than any other likely solution of the problem. —p. 65

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STEEL FOR CASEY JONES: Even the fact that the worst winter in a generation has played havoc with rail transportation cannot detract from the general conviction that American railroads have performed magnificently under the pressure of war. With too few cars and locomotives they have moved an unbelievably heavy volume of freight and passengers efficiently. Moreover, they have done this with a truly noteworthy economy in the consumption of iron and steel.

Starved as were the roads for steel for track, power and rolling stock in 1944, they managed to get along with 5,509,885 net tons. Compare this with the more than 7,000,000 tons required in 1926 and 1929, the more than 6,000,000 tons consumed in 1927 and the more than 5,600,000 taken in 1928 and 1941 and it will be apparent that the rail carriers have been practicing conservation of critical materials to the limit.

This stinting of consumption cannot go on indefinitely. The roads need steel in abundance and when the restrictions are off, they will emerge as one of steel's most important postwar customers. —p. 66

E. L. Shaner

EDITOR-IN-CHIEF

Official U. S. Navy Photograph courtesy Bay City Shovels, Inc.

Inland Steel in the South Seas

Go anywhere among America's fighting men in the South Seas and you will find steel from Inland—sometimes working for Victory at a permanent base—at other times plowing the South Seas, carrying men and supplies in many types of fighting, carrier, and landing vessels.

In the picture shown above an LST, with bow doors swung wide, is emitting a flow of vital supplies for Rendova Island in the central Solomons. Aiding in this work is a crawler-type crane. In the foreground are personnel landing craft. Thousands upon thousands of tons of Inland plates, sheets, and structural shapes have gone into building cranes and craft of these types.

Today, as every day since the attack at Pearl Harbor, Inland mills and Inland men are engaged full time making steel for America at war.

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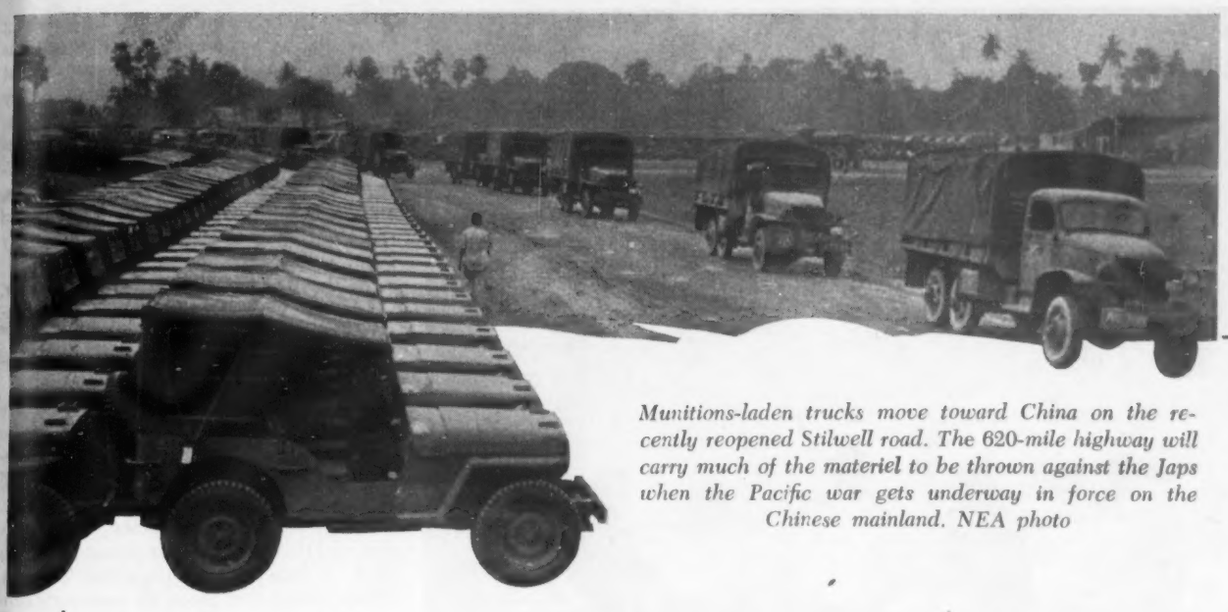


Munitions-laden trucks move toward China on the recently reopened Stilwell road. The 620-mile highway will carry much of the materiel to be thrown against the Japs when the Pacific war gets underway in force on the Chinese mainland. NEA photo

V-E Day To See No Quick Drop in Arms Output

American armies to be largely re-equipped for all-out battle against Japan. Industry's reconversion plans must be scrapped. Cutbacks in first six months after defeat of Germany will be no more than 15 per cent

IF THE European war should end tomorrow, this country's war production would continue unchecked for several months and the aggregate cutback at the end of six months would be no more than 15 per cent.

American industry's earlier plans for a substantial reconversion to civilian goods production after V-E Day have been knocked into a cocked hat. Reconversion after the fall of Germany will be slight and slow, and probably will be under strict government control.

Originally it was expected that the defeat of Germany would be accompanied by a 40 per cent cutback in procurement programs.

This major reversal in policy grows out of decision by the top military authorities that American armies must be re-equipped with weapons especially designed for the Pacific war. United States fighting men in Europe when they are transferred to the Orient will leave most of their heavy equipment behind and will be supplied with the newest and most powerful weapons it is possible to produce.

The high command's decision is based upon two factors: 1. So rapid is the progress in improving materiel that much of the equipment now being used against Germany will be obsolete when the all-out war is carried to Japan; 2. shipping will be at a premium and the military authorities figure new equipment can be manufactured and sent to the Orient more quickly than existing equipment could be transferred from the European theaters.

The outlook for resumption of civilian goods production contrasts sharply with the planning of late last summer and early fall. As viewed by War Production Board authorities, the picture is somewhat as follows:

1. Before the defeat of Germany, war production schedules will continue so tight as to preclude even the preliminary reconversion steps, such as the acquisition of new tools and building of working models.

2. The fall of Germany probably will free enough materials, manpower and facilities to start the preliminary reconversion job but not enough to produce civilian items of any consequence.

3. In the first half year after V-E Day military orders will begin to taper—about 15 per cent—and will free some materials and men to turn out the most essential civilian goods.

4. Large-scale civilian goods production will not be possible until the final defeat of Japan.

Authorities in the war production agencies believe that even if the defeat of Japan requires two years after victory in Europe, military production probably will drop no more than 20 per cent.

It is now agreed that the land armies to be employed against Japan, both on the mainland of China and on Japanese home islands, will have to be much larger than had been anticipated six months ago. The Pacific war, which to date has been predominantly a Navy show, soon will become a land battle of the first magnitude. Many of the troops to be employed in this war will be the veterans of the European campaign. They will be transported from the continent of Europe to the Pacific either directly or after a rest period in the United States. The transfer of these millions of troops will place an extremely heavy burden on available shipping facilities which will preclude the transfer of the heavier equipment from the European theater. Much of this equipment would not be well adapted to the conditions in the Orient.

Although military authorities are reluctant to disclose exact plans for the disposal of equipment now in Europe, it is believed probable that small arms and ammunition and the latest types of aircraft may be shipped to the Pacific fronts.

Scene of the final phase of the war is kept constantly before workers at the Dodge Chicago plant, where engines for the B-29 Superfortresses are built, by this large map. Military officials now are planning to build new materiel for the all-out Asiatic war rather than attempt to transfer surplus equipment from the European theatre

Tanks, bridges, earth moving equipment, heavy trucks, most of which have undergone severe punishment in the German war, probably will be left in Europe.

Neither the Army, Navy nor Maritime Commission is planning any cutbacks following V-E Day. The Maritime Commission, which has a program of 9 million deadweight tons of shipping for the first half of this year, recently placed orders for an additional 4 to 5 million tons for the second half of 1945. Many of the new ships have been specially designed for cargo and troop transport duty in the Pacific.

On the Navy's side of the production picture a major addition to the fleet is under consideration. No decision has been announced as yet, although the Navy insists it will not reduce its requirements. Present indications are that the construction of fighting ships will continue at a high level for a long time to come.

The War Department, which has consistently opposed plans for reconverting to civilian production, apparently will continue this policy for an indefinite period after V-E Day. Time studies made by the Army have satisfied the top command that it can use available ships more effectively and get supplies to the Pacific fronts more expeditiously by shipping direct from production lines in this country.

Although the military officials are setting no date for the fall of Germany, despite recent rapid advances by the Allies, the placing of war orders is being interpreted as a preparation for intensifying the Japanese war. An example is the Navy's rocket program, which is supposed to be largely for Pacific use. Fifteen hundred companies in Ohio, Michigan and Indiana alone are working on $150 million worth of these weapons.

Aircraft manufacturers, who early last fall recived detailed instructions from the Army Air Forces calling for an overall 40 per cent reduction in plane output to go into effect on V-E Day, now have no instructions to reduce their volume when Germany falls.

The 1945 aircraft program now calls for more than 86,000 planes, an increase from a 78,000 program anticipated last fall. Practically all companies are at work on new models designed primarily for Pacific war. Aircraft production officials believe that if Germany should surrender tomorrow this year's production program would not be less than the 78,000 envisioned last November.

At present the 1945 overall war production program calls for an expenditure of $65 billion, compared with a 1944 output of slightly less than $64 billion. The $65 billion program does not include contemplated increases in the naval or merchant ship programs.

This year's program is making one of the war's greatest demands on steel. Requirements for the second quarter are expected to be the highest for any three months of the war to date. One war production official estimates that requests from the claimant agencies will be 25 per cent greater than the steel tonnage available. This heavy steel demand reflects the increasing production schedules for such munitions as shells, artillery and heavy trucks, which are practically all-steel.

To aid war manufacturers in planning to meet the expanded 1945 munitions program, J. A. Krug, WPB chairman, last week outlined a new purchasing policy for the procurement agencies. He instructed them to place their requirements as far in advance as could be anticipated, preferably on an annual basis, and to require prime contractors to pass on orders to subcontractors as quickly as possible.

In the interest of shortening the war, Mr. Krug outlined steps intended to enable war plants to "pull out the stops" and drive ahead toward the year's production goals. These steps include:

1. Procurement claimant agencies have instructed their contracting officers to place promptly contracts covering foreseeable needs, at least through 1945 wherever practicable.

2. Procurement agencies also have directed that in the future prime contracts shall include clauses requiring that: a. Prime contractors place all necessary subcontracts and purchase orders promptly with their suppliers to assure receipt of needed materials and components in time for the scheduled deliveries called for in the prime contracts; b. each contractor in his subcontracts and purchase orders include similar provisions to those in his contracts requiring his suppliers in turn to place orders promptly with their respective suppliers.

Mr. Krug pointed out that a short "buying cycle" by the armed services often makes impossible the tiering down of orders by prime contractors to their subcontractors and suppliers. A longer buying cycle, he continued, will give greater assurances to suppliers and makers of components and will make possible the continuous flow of materiel needed in the Pacific war.

Additional Groups Cancel Plans for Conventions

Co-operation of additional industrial groups with the government's wartime request not to hold conventions has been announced.

The American Zinc Institute, New York, which usually holds its annual convention in April in St. Louis, will comply with the federal government's wartime ban on conventions and not conduct such a meeting this year. It is expected that meetings of active members and directors will be held in New York in April to comply with by-laws, but such meetings will deal only with necessary legal formalities and will require only a limited attendance.

The American Society for Testing Materials, Philadelphia, has canceled its Committee Week that had been planned for Pittsburgh during the week of Feb. 26 and has postponed its spring meeting that had been scheduled for Feb. 28. The spring meeting was to have been a symposium on corrosion prevention. Further announcement will be made concerning it.

Surplus Goods Disposal Discussed

Half of excess will comprise strictly military goods. SPB officials say no real basis exists for fears surplus will be threat to postwar markets

BUSINESSMEN and manufacturers need not be unduly alarmed by recent estimates of various commentators that $100 billion or more of surplus goods will await disposal at the end of war, Robert A. Hurley, member, and Mason Britton, administrator, Surplus Property Board, declared last week. They cannot now estimate the value of surplus goods to be offered and said that much depends upon how long the war lasts and the degree in which goods now in the hands of war agencies are used up. However, on the assumption that the surplus comes to $100 billion, the portion that could be marketed to civilians would not exceed $5 billion.

Fully half of the surplus, on basis of present study, will comprise strictly military goods like tanks, artillery, etc., which could not be sold to civilians. The other half includes plants, tools, real estate, which can be disposed of carefully to assist business and employment after the war, and it also includes a vast amount of goods which will have to be scrapped. It also includes large inventories abroad which will be liquidated abroad.

"There is no real basis for fears that these surplus goods will hang like a cloud over our markets indefinitely and threaten private enterprise," said Mr. Hurley, and Mr. Britton added that as far as possible these goods will be marketed quickly while there is a real need for them rather than held for postwar liquidation.

Since the start of the war about 25,000 aircraft of all types have been declared surplus and only 2300 sold, said Britton. He also said combat planes and bombers appear to have no peacetime use and this statement is supported by the fact that of 2915 surplus combat planes offered only two have found takers.

Another angle encouraging to business is that priority in disposing of surpluses will be given to states, municipalities, hospitals, schools and other institutions which will be granted special prices and this should provide incentive to move goods.

The Reconstruction Finance Corp., they said, now is working with some 150 manufacturers who are interested in buying government-owned plants.

Postwar Forecasts Viewed As Overoptimistic

Both national income and employment will be on considerably lower levels in the postwar years than is indicated by widely publicized official and unofficial forecasts, according to Rufus S. Tucker, economist, General Motors Corp.

Dr. Tucker, whose analysis appears in the January issue of *The Conference Board Business Records*, calls attention to three basic errors in the forecasts. The first is they assume a larger labor force than will exist; second, they assume too low an estimate of unavoidable unemployment; and third, they assume a greater annual increase in output per worker than can be supported by the evidence of past experience.

"Over seven million workers," says Dr. Tucker, "are now employed who would not have sought work if it had not been for the war. Nearly all the men in this emergency labor force will retire from it as soon as the emergency is over, and most of the women as soon as the men in uniform get home. The number of emergency workers remaining in the regular labor force by 1950, other than the boys and girls who would normally have entered it anyway in a few years, will barely exceed the number of war casualties. The total number of persons working or looking for work in 1950 will probably be under 58.5 million, if the nation is peaceful and prosperous, and after deducting the armed forces (2 million) and the minimum amount of frictional unemployment there will probably be fewer than 53.5 million civilian workers.

"Under the present system of unemployment relief, and with present floors under wages, I believe that three million is the minimum possible allowance for unemployment, even in years when the demand for labor is high. The number will be greater in the first two postwar years, because of necessary industrial readjustments."

Present, Past and Pending

■ BETHLEHEM STEEL CONSTRUCTING LARGE ORE CARRIERS
BETHLEHEM, PA.—Bethlehem Steel Co. is constructing at its Baltimore yard the first four of a fleet of the world's largest and fastest ore carriers to be used in transporting iron ore from South America. A Bethlehem subsidiary will operate the vessels.

■ WAGNER, WIEWEL AND FORD ASKED TO RETURN TO WPB
WASHINGTON—Due to increased activity, three former members of the Steel Division, WPB, have been asked to return. They are A. A. Wagner, Jones & Laughlin Steel Corp., Walter Wiewel, National Tube Co., and Thomas Ford, Electro Metallurgical Co.

■ SCHEDULES HEARINGS ON PITTSBURGH BASING SYSTEM
PHILADELPHIA—U. S. Circuit Court of Appeals here has ruled it will hear arguments next month to determine whether or not the Federal Trade Commission's long standing order to the U. S. Steel Corp. of Delaware and subsidiaries to cease and desist from quoting prices on Pittsburgh basing system should be withdrawn.

■ AIRPLANE OUTPUT DROPS 4 PER CENT UNDER SCHEDULE
WASHINGTON—January production of airplanes dropped 4 per cent under schedule to 6535 units and 2 per cent under December's total but increased 2 per cent on an airframe weight basis to 72,300,000 pounds (exclusive of spares).

■ GM SUMMARIZES ITS WAR PRODUCTION RECORD
DETROIT—General Motors Corp. revealed last week that since the beginning of the defense program in 1940 it has produced more than: 140 million shells and shell casings, 180,000 cannon, 1 million .30 and .50-caliber machine guns, 2.4 million carbines, 180,000 airplane engines, 9000 complete bombers and fighters, 31,000 tanks, tank destroyers and armored cars, 740,000 trucks, a major part of all diesel engines produced for the United States and thousands of other items.

■ SCHEDULES HEARINGS ON ALUMINUM, MAGNESIUM
WASHINGTON—Senator Murray of Montana, chairman of Senate Committee on Small Business, announced last week a series of hearings will begin Feb. 27 on postwar use of the expanded aluminum and magnesium industries.

■ CHICAGO WMC OFFICE REVISES DATE OF MANPOWER ORDER
CHICAGO—Regional WMC office here has advanced from March 15 to March 1 the date on which nonessential business must reduce its manpower ceiling 10 per cent. Date of Feb. 15 for making a 5 per cent cut stands unchanged.

■ INCREASE IN ALUMINUM INGOT PRODUCTION ORDERED
WASHINGTON—An increase of 10 million pounds monthly in aluminum ingot output has been ordered by WPB for plants previously curtailed and located at Massena, N. Y., Niagara Falls, N. Y., Badin, N. C., and Spokane, Wash.

Renewal of Miners' Contracts Causes Concern as Coal Use Exceeds Output

Shutdown in April would be immediately felt in war production plants. Stocks are low in most metalworking plants. Severe weather and congested rail traffic have aggravated situation. Sunday operations are suggested

COAL MINERS' contract negotiations, an important factor every second year in the volume of coal production, are more significant than ever this year when a few weeks of mine shutdowns may determine whether there will be an early Allied victory or a debacle resulting from a fuelless and powerless "arsenal of democracy."

Even with the miners at work, coal consumption has been exceeding the United States production, and the dwindling above-ground stocks have been further depleted by transportation tie-ups resulting from heavy snows and low temperatures throughout a considerable portion of the mining and industrial areas.

This is the year for renegotiation of miners' two-year working contracts and if history is repeated and disputes result in the refusal of miners to work, those disputes may well be the proverbial "last straw" and would quickly break down production of industry which now has only about a three-weeks' coal reserve.

To avoid disruption in coal production, it has been suggested that John L. Lewis, president, United Mine Workers of America, open contract negotiations earlier than the customary March 1 date. Suggestions have been made that Mr. Lewis negotiate directly with the federal government rather than with the operators, for it is generally agreed that ultimately the problem will fall upon federal agencies for solution and that therefore time could be saved if the union started its negotiations with the government rather than with the operators.

Strike Pattern Consistent

In recent years there is no case on record where the new contract was signed before April 1, thus making a continuous history of strikes beginning on that date in the odd years.

The record since 1941, during the war years, has been a spotty one. There have been half a dozen major shutdowns, and many small disputes, and wildcat strikes. Nevertheless, record tonnage of coal has been mined and the situation would be comfortable today except for the combination of extremely high consumption, bad weather conditions and overtaxed transport facilities.

The 1941 contract parleys, which resulted in the most serious work stoppage in recent years, featured the split between northern and southern coal operators and the dealing with the two groups separately. Miners' demands included an increase from $6 to $7 per day, which was finally won, but only after the mines had been closed for the entire month of April, and industrial production seriously hampered. The loss in coal production, which at that time was averaging better than 11 million tons per week, was nearly 50 million tons.

There were other difficulties in 1941. The captive mines, so-called because they are owned by steel companies and their entire output is consumed by the owners, were operating under an open-shop contract. However, the union decided in 1941 to press the closed shop issue, and in September there was a temporary walkout, causing a loss of about a million tons, and another walkout in November caused a loss of three million tons. Carried on during all this period were negotiations which finally resulted in adoption of the closed shop contract.

There were no major strikes during 1942, although tonnage was cut several times by wildcat strikes. In 1943, contract negotiations again were due, and although the no-strike pledge was in effect, there were strikes causing a production loss of some five million tons during May. The union demanded a $2 per day increase and portal-to-portal pay, which was declared outside the "Little Steel" formula by the War Labor Board. The negotiations, as usual, reached no conclusion by the April 1 deadline and a strike was threatened, but was averted at the last minute when President Roosevelt appealed to Mr. Lewis and asked for a 30-day extension of the old contract, which was granted on the basis that any changes would be retroactive to April 1. However, no progress was made during April and on May 1 there was a strike, which resulted in government seizure of the mines and appointment of Harold L. Ickes as operator of all mines for the government. WLB decision on the case, after truces, extensions, and other goings-on, awarded no pay increase, no portal-to-portal pay, but granted a $50 vacation pay and eliminated occupational charges. The negotiations dragged on, and finally in November the contract covering portal-to-portal pay was signed, after a rash of unauthorized strikes, which had cost the country production of some 22 million tons during the summer and fall months.

Miners' Objectives Outlined

Last year was relatively uneventful, as off years usually are, with only a scattered series of shutdowns and wildcat strikes. This year promises to be much more active. There has as yet been little indication as to the demands which will be made. The same pressure is being applied as in former years, however, with the usual preliminary skirmishes in the newspapers. Statements have been attributed to Mr. Lewis to the effect that the miner is still the most underpaid worker in America; that he is out to break the "Little Steel" formula; that he will ask for shift differentials, and will not be satisfied with anything less than the WLB granted to the steelworkers. Some sources have mentioned $1.25 as a possible figure on the wage increase to be requested. Other observers believe $2 is more likely, with a reduction of the working day to five hours a distinct possibility. The latter move. of course, is to increase the number of overtime hours at time-and-a-half.

The UMW policy committee, which Mr. Lewis calls up when he wants to make a show of consulting with his union on the demands to be made, will meet in Washington Feb. 26. After a two-day session. the demands will be announced, and on March 1 the parleys with the operators are slated to begin.

One indication of the seriousness of the coal supply situation is an announcement by Solid Fuels Administrator Ickes that negotiations are being held with eight steel and coke companies in the Pittsburgh-Youngstown-Wheeling area aimed at operating some of their western Pennsylvania captive bituminous coal mines on two Sundays in February to increase their stocks of scarce metallurgical coals.

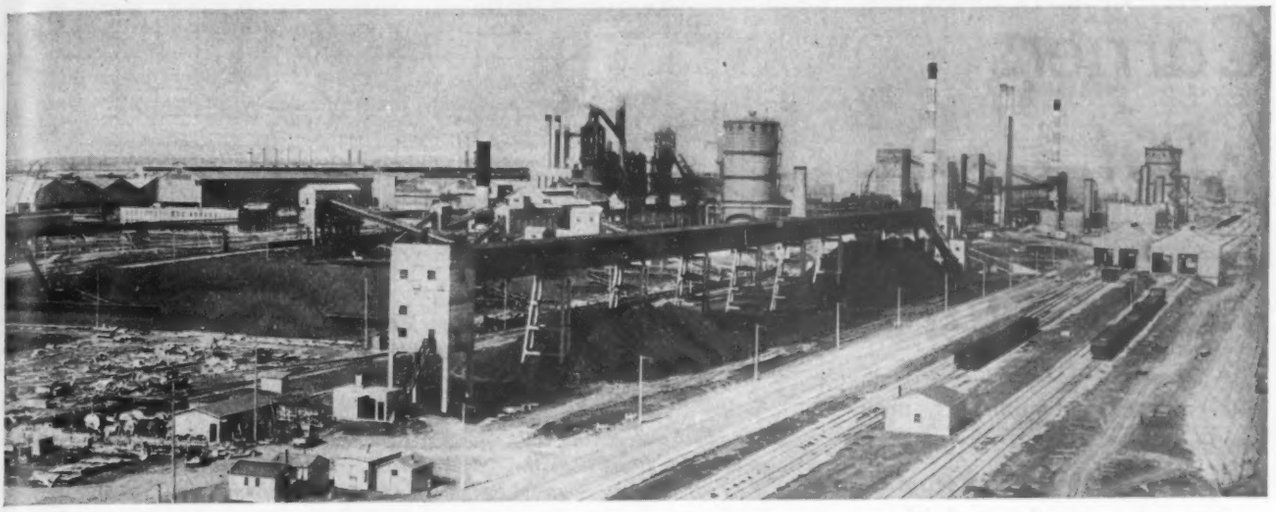
Agreement for the Sunday work was effected with Mr. Lewis, who consented to the arrangement after the extreme urgency of increasing coal production to maintain full operation at the steel plants was explained.

STEELWORKER CITED

Everett Cooper, a painter in a steel plant, has been cited by J. A. Krug, chairman, War Production Board, "for service beyond the call of normal duty."

When heavy snow blocked bus service from his home in Slippery Rock, Pa., to the National Tube Co.'s plant in Ellwood City, Pa., Mr. Cooper covered the 18 miles on foot, leaving his home the night before to make sure that he would be at work on time.

The citation contrasted this unusual display of devotion to duty, performed by a worker who had been rejected by the Army because of poor legs, to the "regrettable degree of absenteeism in war industries" in the face of increasing needs for more war production.



Largest integrated steel plant west of the Mississippi, the Geneva Steel Works, owned by the government and built and operated by United States Steel subsidiaries, will not go begging after the war. Both U. S. Steel and Kaiser Co. Inc., have declared their interest in purchasing or leasing the facilities for postwar operation

U. S. Steel Wants To Buy or Lease Government-Owned Plant in Utah

Notifies Defense Plant Corp. it will maintain as high a rate of postwar operations as warranted by markets. Plans to drop some existing units if Geneva works is acquired. Further investment seen necessary to convert to peacetime operations

UNITED STATES STEEL CORP. is interested in purchasing or leasing the government-owned Geneva Steel Works in Utah for postwar operation and has so informed the government. This was announced last week by William A. Ross, president, Columbia Steel Co., the corporation's West Coast subsidiary.

Benjamin F. Fairless, U. S. Steel president, in a letter to the Defense Plant Corp., which supplied the funds to build the plant, commented that if a mutually satisfactory arrangement for either purchase or lease were concluded the corporation "would expect to undertake to operate them (the facilities) at as high a rate of capacity as would be warranted by the market for their products in the territory naturally served by their facilities."

The corporation's announcement is regarded as a significant indication of the future of the Geneva works, which now represents an investment of about $200 million. The postwar utilization of the Utah plant, and also the Kaiser Co. Inc. plant at Fontana, Calif., has been of primary concern to the steel industry and especially to Pacific Coast industrialists who hope that the war-born plants may be continued in operation after hostilities cease. The future of these plants is being considered now by Western States Council meeting in Salt Lake City, Utah, Feb. 12 and 13.

Kaiser Co. Inc., may compete with U. S. Steel for purchase of the Geneva plant. C. F. Calhoun, vice president of the Kaiser Co., said "we have employed a firm of contracting engineers to survey Geneva with possible purchase in mind."

U. S. Steel, Mr. Fairless told DPC officials, also is interested in buying or leasing the Fontana plant of the Kaiser company should it be offered for disposal. This offer drew from Henry Kaiser the statement that the Fontana plant "is not and will not be for sale." The Fontana plant was financed by loans from the Reconstruction Finance Corp.

Mr. Kaiser estimates that about $37 million will be required to provide facilities to manufacture strip and otherwise prepare the plant for the most efficient peacetime uses.

On or before V-J Day, the Kaiser company proposes to finance the needed capital from such sources and in such manner as any corporation, Mr. Kaiser said. He added that the company has now allocated to the government, on its loans from RFC for Fontana, assets which it believes are ample to pay one third of its loans.

Reconstruction Finance Corp. has engaged Arthur G. McKee & Co., Cleveland, to survey the plant of Kaiser Co. Inc., Fontana, Calif., and the Freyn Engineering Co., Chicago, to survey the plant of the Geneva Steel Co., the report to include an appraisal of plant holdings, raw materials, equipment, freight rates, distribution of finished products, West Coast markets, etc. H. A. Brassert will make a separate survey of the Fontana plant for the Kaiser company.

The Geneva works at present is producing plates and some structurals, most of which go to West Coast shipyards. An investment of $40 million to convert the plant to a wider range of products has been recommended to adapt the works to peacetime needs.

Mr. Fairless in his letter to DPC commented that some of the units now being operated by the corporation are less efficient than the new plant at Geneva. "We anticipate that such acquisition as these facilities would be accompanied by reductions or displacements in existing capacity so that our basic steelmaking capacity would not be increased in the postwar period."

In announcing that U. S. Steel is interested in acquiring the Geneva plant, Mr. Ross stated:

"Recent discussion in the press about the possibilities for the postwar production of steel west of the Rocky Mountains may have led some exponents of the further industrial development of the Far West to jump to the conclusion that United States Steel Corp. and its Pacific Coast subsidiary, Columbia Steel Co., have little interest in the future of the new government-owned Geneva plant.

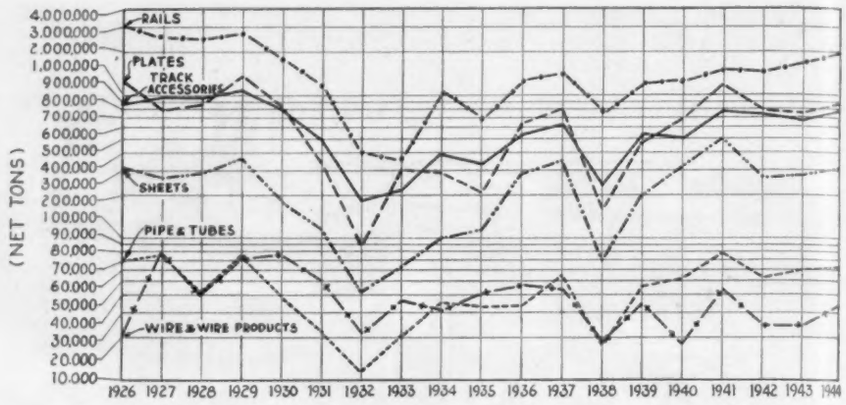
"Any such impression is quite contrary to the truth. This plant in Utah was designed and built for the government by Columbia Steel Co., acting on behalf of United States Steel Corp., and is now being operated for account of the government by another subsidiary of United States Steel, such construction and operation being a war project patriotically undertaken by the Steel corporation without any fee or profit.

"United States Steel Corp. is also an exponent for the continued industrial development of the Far West. It recognized the importance of Pacific Coast steel markets and their potentialities, when it acquired Columbia Steel Co. in 1930. This

(*Please turn to Page* 186)

Carriers' Allotments To Decline

Pressure for munitions may delay delivery of equipment now on order. Builders anticipate large demand from foreign buyers to rehabilitate devastated areas



Above chart depicts the fluctuation in steel mill product shipments to the railroad industry from 1926 through 1944. Encouraging gains in steel allotments to the industry occurred last year, but current outlook is not favorable

DELIVERY schedules on a considerable portion of the railroad car and locomotive equipment now on order may be set back substantially if the pressure for prompt steel deliveries resulting from the augmented munitions programs grows much more acute. The rail and track accessory production schedules for the current quarter have already been pushed back, due primarily to the pressure for shell steel.

Present status of the railroad steel allotment for first quarter delivery is as follows: 196,000 net tons of carbon steel for freight cars, 39,000 tons for locomotives, and 445,500 tons for replacement rails. The overall steel allotment to the industry in 1945 is expected to be somewhat less than last year.

Locomotive and other railroad equipment builders are anticipating a huge foreign demand to speed rehabilitation of Europe and to replace equipment destroyed during the war. Several sizable orders for rolling stock, notably 700 locomotives for France and 500 for Russia, are being placed, and equipment builders anticipate additional orders.

Latest available figures show 36,597 domestic freight cars on order Jan. 1 last, compared with 35,737 a year earlier. Unless there is a downward revision in the production schedules of freight cars for the military there is not expected to be enough available shop capacity to produce all the cars scheduled for the domestic roads. About 26,000 cars for the military were formerly scheduled for delivery in the first half this year, but deliveries on some of these units are reportedly being pushed back into the second half.

Tight manpower situation and lack of necessary parts are holding up badly needed freight car repair work. With freight car and locomotive replacements at abnormally low levels and general deterioration of rolling stock and roadways under extremely heavy war traffic, the railroads' physical status is weaker than before the war and at a time when freight traffic is 121 per cent above 1939.

Breakdown of Steel Mill Product Shipments to the Railroads and Car a

(Net Tons)*

Products†	1944*	1943	1942	1941	1940	1939	1938	19
Semifinished (ingots, blooms, billets, slabs, tube rounds, sheet and tin bars)	130,000	95,366	86,099	130,863	95,802			
Structural shapes and sheet piling	381,000	378,715	348,029	619,961	339,305	228,882	80,016	415
Plates (universal and sheared)	869,000	743,562	795,684	1,117,955	664,437	455,981	159,339	782
Rails—60 lbs. and over	1,994,000	1,640,941	1,460,301	1,462,043				
All other rails	15,000	8,427	7,322	24,840				
Total rails	2,009,000	1,649,368	1,467,623	1,486,883	1,204,403	1,118,013	615,542	1,392
Tie plates and track accessories (incl. track spikes)	799,000	687,830	709,572	720,918	499,710	523,694	234,750	602
Hot-rolled bars (carbon, incl. hoops and bands)	491,000	354,011	318,695	501,282	271,508			
Concrete reinforcing bars		1,626	5,694	10,707	120	2,748	2,755	12
Alloy bars	20,000	13,001	15,353	41,913	15,849			
Cold finished (carbon and alloy)	9,000	5,550	4,525	7,360				
Total bars	520,000	374,188	344,267	561,262	287,477	287,555	86,339	415
Pipe and tubes	61,000	58,421	50,826	77,437	50,252	45,381	17,782	53
Wire rods	600	1,105	4,117	869	1,585			
Wire and wire products (incl. fence posts)	31,800	24,554	24,730	42,989	17,973	34,700	18,463	43
Black plate	115	43	909	239	10,435	146	44	
Tin and terne plate (hot and cold reduced)	60	63	497	3,521	397			
Sheets and strip:								
Hot-rolled	249,000	151,772	134,092	370,912	224,672			
Cold reduced	10,400	10,047	8,549	20,243	32,771			
Galvanized	45,000	14,507	24,187	95,650	43,748	35,325	9,367	65
All other		113	1,056	8,373	6,299			
Total sheets and strip	304,400	176,439	167,884	495,178	307,490	197,320	67,353	342
Tool steel bars	560	489	1,266	2,563	1,251			
Wheels and axles	394,000	316,263	317,975	393,502	238,405			
Forgings		8,598	9,193	10,204				
Steel castings		11,878	13,754	21,377				
All other steel products	400	43,810	30,969	55,064	58,455	188,614	79,582	251
Grand Total	5,500,935	4,570,692	4,363,394	5,740,785	3,777,377	3,080,286	1,361,208	4,298

†Includes steel for railroad track work, buildings and bridges, and purchases by railroad car and locomotive builders and parts manufactur

Production of freight cars for domestic roads last year totaled 40,392 units. This was slightly better than that recorded in 1943, but still far below the 1942 production. Locomotives placed in service last year numbered 938, a gain of 165 over the 1943 production.

The nation's railroads and independent car shops purchased an estimated 5,500,935 net tons of steel mill products last year. This represents 9.1 per cent of the total mill shipments for that period, and represents the largest steel purchases by this industrial group since 1941 when 5,740,785 net tons of steel were shipped to the railroad industry. In 1943, 1942, 1941 and 1940, the railroads purchased 7.6, 7.1, 9.1, and 8.2 per cent, respectively, of the total mill shipments.

Shipment of 2,009,000 net tons of steel rails to the railroads last year represented the largest tonnage for any year since 1929, when rail shipments amounted to 2,659,661 tons. In 1943 and 1942 steel rail shipments totaled 1,649,368 and 1,467,623 net tons, respectively.

The railroad industry purchased an estimated 520,000 net tons of steel bars last year, the largest in any year since 1941, when purchases amounted to 561,262 tons. Hot-rolled carbon bars represented the bulk of these purchases, amounting to about 491,000 tons in 1944, against 501,282 in 1941. A sharp upturn in alloy steel bar purchases also developed last year, but the tonnage remained relatively small, estimated at about 20,000 tons.

Sheet and strip purchases by the railroad industry last year of about 304,000 net tons was almost double the 1943 total, and with the exception of 1941 and 1940 was the highest recorded since 1937.

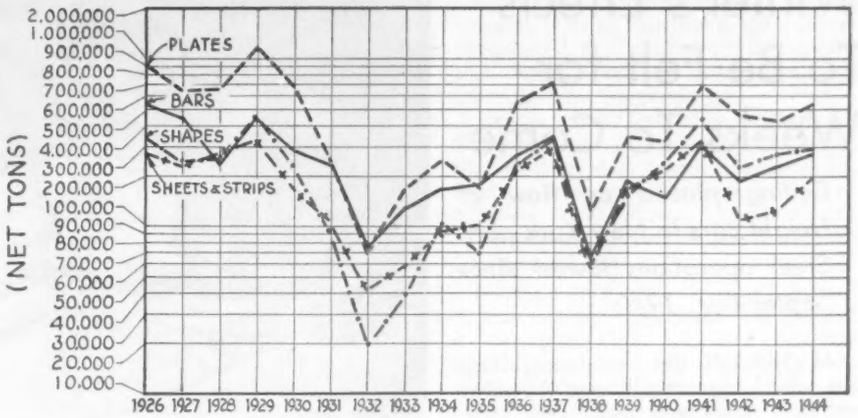
This year is expected to witness the most critical period in the entire history of American transportation, due to the inability of both the railroad and truck carriers to maintain equipment in efficient operating condition because of the lack of manpower and materials.

Mounting military requirements are adding to the railroads' freight load. With two widely separated wars to be supplied, the railroads are being called upon to haul more equipment and to haul it further. Particularly heavy traffic will be routed over the western lines and this increase is developing at a time when the shipments to the eastern ports are currently running ahead of last year.

The sharp expansion in freight traffic during this war period is illustrated by the fact that in 1944 the carriers moved 737 billion ton-miles of freight, more than double that of 1939. Passenger traffic last year was four times the 1939 total. The record tonnage of freight hauled by the railroads last year was accomplished with virtually the same number of locomotives as in 1939 and with but a slight increase in the number of freight cars.

Without serious congestion the railroads handled the greatest volume of export freight on record in 1944. Cars of export freight, excluding coal and grain, unloaded at all ports in this country last year totaled 1,866,324, against 1,401,186 in the preceding year.

RAILROAD CAR BUILDERS TAKE MORE STEEL IN 1944



comotive Builders by Product Classification from 1926 Through 1944

(Net Tons)

1936	1935	1934	1933	1932	1931	1930	1929	1928	1927	1926
56,306	116,709	156,386	90,398	58,439	347,440	564,925	811,998	554,329	444,148	647,588
30,018	204,098	282,070	290,104	87,040	326,164	807,564	1,341,117	827,820	779,299	1,251,491
							2,655,060	2,446,879	2,504,137	3,014,655
							4,601	1,851	292	849
15,533	684,030	1,023,775	366,628	392,314	1,162,107	1,784,746	2,659,661	2,448,730	2,504,429	3,015,504
37,279	325,151	389,551	214,500	180,427	475,896	793,012	1,074,752	950,726	970,406	855,614
13,752	3,699	9,057	4,193	8,572	21,982	27,401	61,903	31,678	6,938	
49,405	213,226	198,604	178,516	100,944	236,625	440,563	763,843	396,447	615,162	807,844
33,037	33,298	35,368	20,597	11,733	22,551	39,052	75,507	42,312	75,037	69,442
46,577	41,842	31,574	36,563	21,324	50,317	77,027	72,623	50,617	78,581	21,447
558	1,120	857	4	9	370		3	2		
37,841	18,873	15,835	11,178	9,703	30,627	50,674	121,266	61,906	61,094	
80,756	111,405	98,454	60,906	41,805	118,071	180,510	364,766	284,810	268,411	317,024
39,058	75,465	87,901	69,850	54,728	114,397	205,059	319,111	185,189	365,823	563,616
38,525	1,806,354	2,305,491	1,238,067	948,763	2,853,982	4,892,459	7,483,350	5,651,384	6,213,298	7,549,572

Figures for 1926-39 compiled by STEEL; for 1940-43 by American Iron and Steel Institute. *Estimated.

Winter's Effects To Be Felt for Weeks To Come

Ceiling placed on flow of freight cars to New York port. Steel operations lowest since September, 1940

ALTHOUGH the northeastern states last week had practically dug themselves out from under abnormally deep snow they and other parts of the country will feel the effects of winter-bound traffic conditions for weeks to come.

To avert a threatened tie-up of export freight at New York harbor, the railroads in co-operation with the government moved to reduce temporarily the flow of loaded cars to the port. Threat of congestion arose because of issuance of permits for loading to New York beyond the present capacity of the railroads and the ports to handle the cars. The threat was augmented by ice conditions in the harbor and rail manpower shortages. It is reported that for the next three weeks the consignment of cars to New York for export will be limited to 12,000 cars weekly, the estimated present capacity of the railroads serving the harbor. As a result, some shipments of both government and commercial freight which already have been permitted to move may be delayed temporarily.

At Buffalo, milder weather and members of the armed forces aided railroad operations to get back to about 75 per cent of normal. While the railroads placed emphasis on coal and coke in movement of material, steel mills also reported some improvement, even though record accumulations continued to clog finishing departments.

As a result of manpower shortages and unfavorable weather conditions, the nation's steelworks operations at 89.5 per cent of capacity this past week were the lowest since September, 1940.

The country's utility systems and industrial consumers must co-operate throughout the rest of the winter if a disastrous collapse of natural gas service in the midwestern industrialized areas is to be averted, J. A. Krug, chairman, War Production Board, warned.

Such a collapse was averted recently in western New York, Ohio, and Pennsylvania by only a few hours. Such crises will develop again during the next two months of this winter, Mr. Krug predicted, and it again may be necessary to resort to restrictive measures on the use of gas to protect vital war production.

Conditions that might lead to heavy spring floods and cripple war production in northern New England are being watched closely by the War Production Board, utility companies, railroads, and industries.

Soldiers furloughed by the Army helped clear snow from tracks in Buffalo freight yards. This night photo shows a crew of doughboys shoveling ice and snow from switches

Finished Steel Shipments Record-Breaking In 1944, Though Not in All Products

SHIPMENTS of finished steel in 1944 set a record at 63,235,000 tons, gain of 1,025,000 tons over the 1943 total, the American Iron and Steel Institute reported last week. Excluded in the total are tonnages shipped from one steel company to another for further processing.

Fewer records were set last year in shipments of individual classes of products than was the case in 1943. On the other hand, in accordance with war agency directives, 19 of 27 major product categories scored 1944 shipment gains over the preceding year although these shipments were not necessarily of record-breaking magnitude.

Records were established in shipments of seamless pipe and tubing, 2,356,000 tons; finished black plate, 610,000 tons; mechanical tubing, 805,000 tons; cold-finished carbon bars, 1,775,000 tons, and semifinished steel, 8,701,000 tons.

Shipments of hot and cold-rolled sheets, galvanized sheets and hot and cold-rolled strip, although not setting new records showed gains over 1943 totals.

Similarly in 1944 there were increased shipments of steel piling, buttweld and lapweld pipe, conduit, rails and fastenings, concrete reinforcing bars, tin plate, and drawn wire.

Shipments of steel plates, fell off from the record deliveries of 1943, amounting to 12,866,000 tons, compared with 12,967,000 tons in 1943.

Decreases in shipments between 1943 and 1944 also occurred in hot-rolled and cold-finished alloy steel bars, hot-rolled carbon bars, tool steel bars, electric weld pipe, miscellaneous wire products and structural shapes.

Monthly shipments during 1944 were ahead of the corresponding months of 1943 except in the last quarter of the year, when they fell behind the tonnage in the corresponding months of 1943. Ingot production began falling behind the preceding year in September, a month earlier than shipments, but in December, 1944, output was again ahead of output in the corresponding 1943 month.

National Steel Reports Profit of $10,751,369

National Steel Corp., Pittsburgh, reports 1944 net income of $10,751,369, equal to $4.87 a share on capital stock, compared with $11,698,362, or $5.30 a share, in 1943. Fourth quarter net income of $2,670,396 was little changed from the previous three months showing but compared unfavorably with profit of $3,279,885 registered in the like 1943 period. Fourth quarter earnings were lowered by provision of $2 million for 1944 wage adjustments.

Sheet & Tube Has 1944 Net of $7,944,921

Net profit of Youngstown Sheet & Tube Co., Youngstown, O., totaled $7,944,921, equal to $4.25 a common share, last year. This compares with 1943 net of $8,037,422, or $4.31 a share. Rising labor and raw materials costs, combined with production changes to less profitable items under War Production Board allocations, chiefly account for the decline in earnings, company officials state.

Experts Bring Subject to Audience

Cleveland tool builders and manufacturers of electrical drive and control apparatus hear presentations on new equipment despite ban on conventions

CLEVELAND

UNDER sponsorship of the Machine Design division, Cleveland Engineering Society, a conference on machinery electrification was held at the society's headquarters Feb. 5-6. In attendance were 160 representatives of northern Ohio machine tool industry and leading manufacturers of electrical drive and control apparatus.

Due to the virtual ban on conventions, the method followed in this case is of interest in that it does away with any large amount of inter-city travel. In a center such as Cleveland a large and diversified audience can be gathered locally—as in this case—to hear presentations on new equipment and methods by authorities from other industrial centers. The subject is brought to the audience, in other words, rather than the audience being brought to the subject.

Among those who addressed the two-day session in Cleveland were: Ben Graves, director of design, Brown & Sharpe Mfg. Co., Providence, R. I., on future of machine tool design; L. W. Scott Alter, president and general manager, American Tool Works Co., Cincinnati, on electrical requirements of the machine tool industry; B. J. Dalton, electrical engineer, General Electric Co., Schenectady, N. Y., on electronic applications to machinery; R. H. Clark, electrical engineer, Warner & Swasey Co., Cleveland, on electrical standards and codes; G. A. Caldwell, manager of engineering, Machinery Electrification Section, Westinghouse Electric & Mfg. Co., East Pittsburgh, on tailoring of motors to fit specific applications; and F. A. Wright, manager of resale sales, Cutler-Hammer Inc., Milwaukee.

Many Informal Talks Given

Among those who gave informal talks were: D. E. Inman, president, Cleveland Engineering Society; J. W. Greve, associate editor, *Machine Design*, chairman of the Machine Design division which sponsored the meeting; Paul L. Hoover, head of electrical engineering department, Case School of Applied Science, Cleveland; Max E. Lange, engineer, Warner & Swasey Co., Cleveland; R. C. Heinmiller, plant engineer, Foote-Burt Co., Cleveland; Harold Johnson, chief of standards division, General Motors Corp., Detroit; and Tell Berna, general manager, National Machine Tool Builders' Association.

Mr. Johnson complimented the machine tool industry on progress being made toward making electrical equipment more rugged and "get-at-able." He urged close attention to operating convenience in design of postwar tools and elimination of idle time in work loading and unloading. Mr. Berna stressed the importance of using the best of our war surplus tools to replace the older machines in our plants, rather than letting them be used to implement our potential foreign competitors. If the best of these machines stay in our own plants and the "junkers" go "into the cupola," American industry will be benefited tremendously, Mr. Berna said.

Tool Orders Far in Excess of Production

Lack of manpower and military pressure for production of direct war items are seriously hampering tool builders from meeting the sharply augmented machine tool requirements.

Tool shipments have shown only slight variation each month since last August, with the December total of $36,700,000 about 1.4 per cent greater than November and only 5 per cent ahead of August's volume. During this period the industry experienced a sharp upturn in machine tool demand for the heavy shell and other key war programs.

New orders in December amounted to $65 million, or 77 per cent in excess of shipments in that month. As a result, machine tool order backlogs have risen to above $260 million, compared with $235 million on Nov. 30 and $197 million Aug. 31 last.

Machine tool order backlogs continued to increase throughout January and further gains are indicated for this month as new tool requirements, particularly for making artillery shell and other ground force equipment, continue to expand. Still another potential source of new orders is the replacement of tools in small arms plants for many of these tools were transferred to other war contractors when the small arms program was cut back early in 1943.

War Production Board order halting output of industrial machinery and plant equipment for postwar use will materially slow up reconversion steps many manufacturers had under way. About 15 per cent of the $160 million tool order backlog at the close of last year represented postwar machine tools.

POSTWAR PREVIEWS

SURPLUS PROPERTY—Small percentage of excess can be sold to civilians. SPB officials doubt that surplus will be threat to postwar markets. See page 63.

GENEVA STEEL— United States Steel Corp. and Kaiser Co. Inc. express interest in buying or leasing plant for postwar operations; may discontinue some existing units. See page 65.

RAILROADS—Carriers, carrying heavy burden of war traffic with skimpy replacements, have accumulated deficit of postwar equipment demand. See page 66.

CONTRACT SETTLEMENT— Three new regulations designed to increase production and smooth industry's reconversion problems after war is won. See page 74.

WEST COAST— California s postwar unemployment estimated at between 450,000 and 800,000. Job possibilities for peacetime analyzed. See page 83.

JET PROPULSION—Serious metallurgical and mechanical problems must be overcome before jet propulsion and gas turbines become economical or practical. See page 84.

UNIT CONSTRUCTION—Temporary, demountable truss spans with interchangeable members joined by drift pins and bolts, finding wide use by Allied armies, suggest possibilities for this method of assembly after the war. See page 92.

HEAT TREATING—Eastern manufacturer applies induction heat to continuous heat treating of tubing by new process which may find wide acceptance in the future. See page 94.

WELDING MANIFOLDS—New method for fabrication of helix-type manifolds for supercharged diesel engines by electric welding provides industry with improved technique which undoubtedly will prove useful later on. See page 96.

Fate of Job Draft Bill in Doubt; 180,000 Needed in "Must" Programs

Dispute arises as to who should have control of powers over manpower. Senator charges Army wants power vested in Selective Service. Proposals are viewed cooly by labor unions and by National Association of Manufacturers

THIS NATION which thus far has waged two wars simultaneously without job draft legislation may continue onto victory without seeing such governmental control placed into effect.

Just after the May-Bailey limited national service bill appeared well on the way to becoming law, it bumped into a snag in the Senate Military Affairs Committee. Previously it had passed 246-165 in the House, which provided for the Selective Service System to administer the legislation. The Senate committee which recommended an amendment to place on James F. Byrnes, director of War Mobilization and Reconversion, the responsibility of administration had unofficially voted 7 to 2 to report the bill out to the Senate, but before the committee could take official action it suddenly decided to defer action.

Sen. Edwin C. Johnson (Dem., Colo.) charged that the War Department, by blowing hot and cold on the question, had confused the whole issue. "The War Department has sabotaged the work-or-jail bill," he declared. "Officially, and on the record, they advocated that the powers be delegated to Mr. Byrnes. Behind the scenes, privately and by telephone, they don't want it. In private contact with senators on the military committee they urged that these powers be placed under Selective Service."

Passage Doubted

Now that the work-or-jail bill has been delayed and with the fall of Berlin imminent the question has been raised whether such legislation ever will become effective at this late date, even though the wars are not over. Although the Nazis have declared they will fight from every hamlet after Berlin falls, it is believed generally that the fall of Berlin will quicken the collapse of the rest of German resistance. With the marked progress of the American forces in the Pacific, it is the consensus that after V-E Day and the transfer of Allied troops from Europe to the Pacific area that defeat of Japan will be hastened. If Germany can be defeated without the benefit of work-or-jail legislation in the United States, it appears unlikely that such a measure would be enacted solely for use in the war on Japan. Proponents of such legislation point out repeatedly that the time to have enacted such a law was at least two years ago.

Meanwhile, various government agencies and employers are trying to use every means at their disposal to direct enough workers into war plants to meet the armed forces' requests for materiel. An incongruity has been thrust into the manpower picture by the weather-enforced one-day-a-week idleness of thousands of men and women in the northeastern states where stores, restaurants, special service shops, and schools have remained closed at least a day a week to conserve fuel that became critically short after heavy snows and low temperatures snarled transportation.

Although preliminary reports indicate current gains in war plant employment, they fall far short of meeting requirements, Paul V. McNutt, chairman, War Manpower Commission, reported.

Employment in munitions plants increased 50,000 in December, in sharp contrast with the steady decline of 100,000 per month for the preceding year. Still further gains in war plant employment probably occurred during January, according to preliminary reports.

In 1500 highly important "must" plants reporting output behind schedule on Jan. 12 last, there is an immediate need of about 180,000 workers. Thousands of other plants at the same time report labor shortages. In many of these the shortages may soon become acute, he said.

Mr. McNutt believes the immediate causes of the gains in war plant employment are the expansion of some of the critical programs which have created thousands of new jobs, and the general realization that the war is by no means over. Since Jan. 1 this upward trend has undoubtedly been influenced by statements of manpower needs which have accompanied discussions of manpower legislation.

The filling of 100,000 jobs in December and the first half of January is only the beginning in meeting the 700,000 required in the first half this year, he stated. The need for the 700,000 workers is in addition to 900,000 men of military age who will be inducted by June.

By next June there will be a normal increase of about 500,000 in the labor force, Mr. McNutt stated. It is expected that about 400,000 veterans will be discharged from the military services, but no one can accurately forecast how many will go into essential industry. An additional force of 200,000 workers is anticipated from already scheduled curtailed war programs. In the case of this decline in production of some items a part of that force will be automatically transferred to expanding production programs. Contracts are being awarded on the basis of using the same facilities. However, there will be numerous cases in which the man-

PINCHED FOR SLOW-DOWN: Booked on disorderly conduct charges after they were charged with causing a slow-down in the John Wood Co. plant, Chicago, makers of packing boxes and cases for the army, these eight workers, all members of the United Auto Workers, are shown in court. In foreground at right, Anthony Gruszka, union representative, talks to Capt. George Barnes of the Chicago Police labor detail. The defendants, left to right, are: Fred Gilbert, colored, Thomas Mazur, Joseph Rogas, Kaz Kurihara, Japanese, Martin Schmidt, Adolph Sillman, Edmund Lewis and Joseph Warner. NEA photo

power thus released will not be available for further employment because of the geographical location of the plants in which they are needed, or because of the lack of specific skills on the part of some released workers. New workers who enter the labor market as the result of the normal growth of the labor force will be directed to urgent employment. The remainder of workers not obtained from these potential sources must be made up by the transfer of workers from less essential activities.

Some of the critical industries immediately in need of workers, Mr. McNutt said, include:

Shipbuilding — Current manpower needs on the "must" shipbuilding and ship repair programs total about 35,000.

Heavy duty tires — Production programs expanded. To meet an emergency situation the Army furloughed 2300 soldiers to tire plants through Jan. 15. About 1300 workers are needed for work directly in the heavy duty tire plants; additional workers are urgently needed in the component plants, such as tire cord and fabric.

Aircraft—Despite an increase of 10.7 per cent in output weight in December, production of "must" types of aircraft is scheduled for a 66 per cent increase by June. Manpower needs, estimated at about 35,000, are largely concentrated in six airframe and two engine plants.

Ammunition—Production schedules in several types are being increased. Three of 22 plants loading and assembling ammunition are now having manpower difficulties and ten others face serious recruitment problems because of expanding schedules. In addition to the 16,500 workers currently needed in the ammunition plants the production of ammunition is being adversely affected by shortage of workers in the brass mills, lead mines and shell forge shops. About 6000 workers are urgently needed in the production of large artillery ammunition.

Navy rockets—Lack of component parts and manpower shortage of 2600 at present are holding up output in explosive and loading plants. Further expansions are scheduled.

Tanks and self-propelled guns—Tank production was 5 per cent below schedule in December. Current need of 4300 workers was not the major factor in the failure to meet production goals but expanded schedules will require an intensive recruitment program.

Heavy trucks—Output is still substantially below military requirements, although some gain has been recorded. Labor recruitment problems are serious because plants are located in labor shortage areas. Current manpower needs are placed at 5500.

Aluminum sheet—Inventories have dropped one-third, necessitating 33 1/3 per cent increase in production. Plant facilities are available, but recruitment of workers is difficult because plants are located in labor shortage areas. Aircraft programs will suffer unless needed manpower is located for these aluminum sheet plants.

Supreme Court May Rule on State Labor Laws; Texas Act Invalidated

Unions challenge statutes as violating constitutional guarantees of free speech and assembly and claim they conflict with federal legislation. Alabama, Florida and Wisconsin acts face test before high tribunal

A COMPREHENSIVE ruling on state laws policing labor unions and their activities may be made in a few months by the United States Supreme Court.

The court, which last month invalidated a Texas labor law requiring licenses for paid labor organizers, has before it on appeal similar cases from Alabama, Florida, and Wisconsin.

The states have contended that it is within their police powers to place unions under some form of regulation such as licensing and registration as a protection in the "public interest" of their citizens. In every case the unions have challenged the statutes as violating the constitutional guarantee of free speech and assembly. The unions also claim that such laws conflict with federal labor legislation such as the National Labor Relations act.

The tribunal, in declaring the Texas law unconstitutional, held that it ran afoul of freedom of speech and assembly. The law required that labor organizers be registered with the state before soliciting new union members.

G. STRUVE HENSEL

Mr. Hensel, general counsel of the Navy and chief of its procurement legal division, has been named assistant secretary of the Navy Department, succeeding Ralph Bard, now under secretary. Since joining the department in January, 1941, Mr. Hensel has aided in developing procurement contract and contract termination policies for the Navy.

The Alabama law is being contested in cases filed by the CIO and AFL from decisions by the Alabama Supreme Court upholding the state. The Supreme Court has agreed to rule on the law in the AFL case, but the CIO appeal is pending.

A Florida AFL group is testing the Florida law on the premise it violates free speech and assembly.

The Wisconsin case involves a test of a maintenance-of-membership clause in a collective bargaining contract between the United Automobile Workers, CIO, and the Wisconsin Motor Corp., West Allis, Wis.

Committee Appointed To Advise on Standards

A committee of eight industrial executives with Charles E. Wilson, president of the General Electric Co., Schenectady, N. Y., as chairman has been appointed to advise the Department of Commerce and the American Standards Association on future plans for standards work.

The appointments are the first action to come from a conference of 50 business leaders in New York in January at the invitation of the Secretary of Commerce to make recommendations concerning roles which should be played by government and industry in standards activities.

Named with Mr. Wilson to the committee are: Frederick M. Feiker, dean of engineering, George Washington University; Clarence Francis, chairman, General Foods Corp.; Ephraim Freedman, R. H. Macy & Co. Inc.; Frank B. Jewett, president, National Academy of Sciences; William B. Warner, president, McCall Corp.; Arthur D. Whiteside, president, Dun & Bradstreet Inc.; and R. E. Zimmerman, vice president, United States Steel Corp.

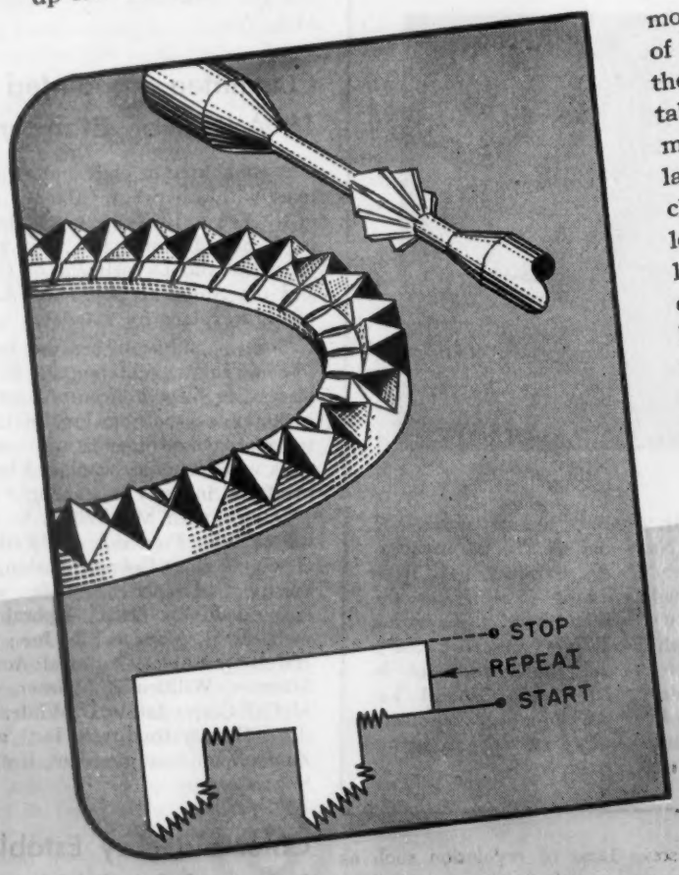
Colombia May Establish Iron and Steel Industry

Possibility of establishing an iron and steel plant in Colombia to utilize the iron deposits discovered in 1942 at a point near Paz del Rio, is being considered, according to the Department of Commerce.

Costs of production and transportation have not yet been sufficiently appraised to determine the economic feasibility of the project. A portion of the required capital would be subscribed by the Institute de Fomento Industrial.

Milling a SET OF TEETH in a PINKING KNIFE

Here a CINCINNATI 0-8 Automatic Rise and Fall Miller, with Cam Roller Attachment, is tooled up for milling the teeth in pinking knives for a textile machine. From start to finish the entire operation is automatic. ¶ The fixture is hydraulically operated, and arranged for indexing the required number of teeth. Power for indexing is supplied from a small hydraulic motor mounted at the extreme right rear corner of the fixture. The fixture is synchronized with the automatic operating cycle which controls table and vertical spindle movements of the machine. The part is secured by means of a large formed washer and "C" washer, allowing clearance for the cutter. ¶ After the fixture is loaded, the operator simply flips the starting lever and the machine performs the operation of milling all the teeth automatically. ¶ Perhaps there is a milling operation in your shop where a setup such as this could be used to advantage. Why not talk it over with our Application Engineers?



Left: A section of the circular pinking knife, and the cutter used in milling the teeth. The automatic feed cycle for milling one tooth is also shown here. When once started, the cycle repeats until all the teeth in the knife are milled.

Keep on buying WAR BONDS

THE CINCINNATI MILLING MACHINE

Left: CINCINNATI 0-8 Automatic Rise and Fall Miller with Cam Roller Attachment, tooled up for an intricate job of milling the teeth in pinking knives for textile machines.

Right: CINCINNATI 0-8 Automatic Rise and Fall Milling Machine. Catalog M-964-1 contains complete specifications. Sweet's Catalog File gives a brief description of the 0-8.

CINCINNATI

MILLING MACHINE CO. CINCINNATI 9, OHIO, U. S. A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

OCS Rules Designed To Lift Output, Smooth Reconversion

Regulation No. 10 provides procedures for prompt removal of termination inventories; No. 11 authorizes destruction of certain original records, provided their photographs are retained; No. 12 deals with defective and quasi-contracts

OFFICE of Contract Settlement has issued three new regulations designed to speed war production now and to smooth industry's reconversion path after victory. Regulation No. 10 provides speedy procedures for the removal of termination inventories; regulation No. 11 authorizes war contractors to destroy original records provided photographs or microphotographs are retained; and regulation No. 12 prescribes procedures for war contractors to use in filing claims based upon defective, informal and quasi-contracts.

The following general procedures for plant clearance are established in regulation No. 10: As soon as possible after termination, a war contractor shall file schedules of all terminated inventory in his possession allocable to the terminated portion of the contract. Separate schedules with satisfactory classification and description must be made, on the forms designated, of the following: (1) Metals in mill product form (OCS form 2a); (2) raw materials (other than metals), purchased parts, finished components, finished product and miscellaneous (OCS form 2b); (3) work in process (OCS form 2c); (4) dies, jigs, fixtures and special tools (OCS form 2d), not including plant equipment provided under a separate contract or contract provision specifically governing the use or disposition thereof. (Plant equipment is covered in OCS regulation No. 4).

Additional Information Required

On or with these schedules, the contractor must: (1) Make tender of title to the government for all contractor-owned material listed; (2) make an offer for such of the listed material as he desires to retain; (3) make recommendation as to the material to be scrapped; (4) inform the contracting agency whether he can make available storage space for any or all of the material.

Unless the contracting agency informs the contractor within 10 days that the schedules are not satisfactory, the schedules will be deemed to be satisfactory in form. Within 20 days following receipt of satisfactory inventory schedules, the contracting agency must, if practicable, notify the contractor which items may be disposed of as scrap, which items the government will require for its use, and which items the war contractor will be permitted to retain at prices agreed upon.

Within 60 days of the receipt of satisfactory inventory schedules, or such longer period as the contractor may agree, all termination inventory on the schedules not disposed of to or by the contractor shall be removed by the contracting agency or stored under agreement with the contractor in space made available by him on terms and conditions negotiated by the contracting agency and the war contractor.

Other sections of the regulation: Provide for prompt filing of inventory schedules for plant clearance by subcontractors; set forth contractor's right to store termination inventories on his own premises or elsewhere at his own risk; set forth contractor's right to remove or store at government risk and expense any termination inventory, if the contracting agency fails to arrange for storage within 60 days after receipt of a satisfactory inventory schedule.

New Record Requirements

Regulation No. 11, dealing with the destruction of original records under certain circumstances, applies to any records of a war contractor relating to the negotiation, award, performance, payment, interim financing, cancellations or other termination, or settlement of a war contract of $25,000 or more; any records of a war contractor and any purchaser relating to any disposition of termination inventory in which the consideration received is $5000 or more; and any records of a war contractor which by the war contract of $25,000 or more; any record of preserved or made available. Provisions of this regulation do not supersede requirements of the comptroller general of the United States for preservation and submission of original and supporting records in connection with cost-plus-a-fixed-fee contracts.

The regulation requires that reproduced records may replace originals only if the primary usefulness of the records has not been destroyed through the photographic process; if significant characteristics, features or other attributes of a record have been retained in the reproduction; if the photographs are certified as being accurate and complete reproductions of the originals. Minimum standards for film and processing are established and special provisions are made for microfilm.

Regulation No. 12 provides that claims for relief and supporting papers, dealing with claims under defective, informal and quasi-contracts, must be filed with the contracting agency which purported to make the prime contract, or whose officer or agent is alleged to have given the instructions or made the request to proceed, or placed the order for the materials, services or facilities in question. The claim must be made under oath, must be verified by the claimant, and must be accompanied by affidavits of persons having knowledge of the relevant circumstances.

Additional Standards for Surplus Property Issued

Surplus Property Board has issued a pamphlet containing section IX, covering industrial and service machinery and equipment, of the handbook of Standards for Describing Surplus Property. This handbook establishes minimum standards to be used by contractors and government agencies in describing inventories and is designed to supply sufficient information in commercial terms to allow a surplus property disposal agency to arrange for resale without calling upon the owning agencies for additional items of description.

Production of Radiation Units Continues To Drop

Six months would be needed to fill present unfilled orders for radiation units if no new orders were placed, War Production Board officials reported recently. Production was 25 per cent below schedule in 1944 and is continuing to decline in the face of expected sharp increases in requirements for 1945. Estimates indicate that about 3,250,000 square feet of radiation will be needed for the veterans' hospital program. Minimum radiation requirements for 1945 are 25 per cent of the prewar output while actual production last year was about 20 per cent of normal peacetime output.

Metal Screen Cloth Needs Exceed Output Capacity

Requirements for metal screen cloth are far in excess of present production, which is seriously curtailed by manpower shortages, War Production Board reported recently. Since about 80 per cent of the industry's output is manufactured in No. 3 labor areas, it is hoped that additional workers can be recruited.

Diamond Dies Being Precision-Made in U. S.

Small diamond dies are now precision-made by American workers, the War Production Board reported recently. New scientific methods are used in diamond die production instead of hand-drilling and laborious polishing done by French and Netherlands craftsmen who filled our needs prior to 1939.

New electro-mechanical methods of drilling diamonds, perfected by scientists

under WPB auspices, are being adopted by die manufacturers with a remarkable decline in die costs and increasing quality and quantity of superfine wire production, WPB said. Important new discoveries point to diamond die production in 6 man-hours against even the present record of 20 man-hours per die.

The small diamond die industry is on the threshold of inexpensive commercial drilling of diamonds to proper contours, through assistance of electric sparks, WPB said. Electrolytic predrilling of diamonds, developed recently by WPB and collaborating scientists, consists of shooting an electric spark into a diamond from a platinum needle while both are immersed in a chemical solution. Such action drills or "burns" a microscopic cone in the diamond, which subsequent polishing forms into a finished diamond die.

The diamond die industry has been provided also with new methods of producing and grading diamond powder, through the efforts of WPB and the National Bureau of Standards, under the same diamond die research project.

Electric Range, Fan and Iron Production Authorized

Manufacturers who were authorized to produce domestic electric ranges, domestic and commercial electric fans, and electric irons in 1944 but who have not obtained the necessary labor clearance for 1945 authorizations, have been assigned temporary authorizations to continue production, the War Production Board said recently.

Malleable Iron Range Co., Beaver Dam, Wis., has been assigned a final authorization for the production of 3750 electric ranges in each of the first two quarters of 1945.

Production authorizations assigned under 1944 programs for these products have been canceled and any of these items that are completed in the first quarter of 1945 will be considered part of the total amount authorized for that period under the 1945 programs. Manufacturers who wish to obtain final production authorizations and all tments of material for the first quarter should file forms WPB-3700 and WPB-3820 with their local WPB field offices immediately, since final authorizations likely will be issued by Feb. 15.

The approved quarterly programs for 1945 are: 35,000 domestic electric ranges, 25,000 domestic and commercial electric fans, and 526,500 electric irons.

Resistor Shipments Rise But Cost Drops 31 Per Cent

Manufacturers of resistors shipped 600,496,000 units valued at $48,000,682 in 1944 compared with 398,361,000 units valued at $35,066,000 in 1943. Average cost per resistor dropped from 10.3 cents in August, 1943, to 7.1 cents in January, 1945, a reduction of 31 per cent.

PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives issued by War Production Board and Office of Price Administration

INSTRUCTIONS

LEAD: No producer may use lead now as a protective sheath for copper insulated wire or cable unless it is one of the following types: Fire alarm and traffic control; telephone and telegraph; railway signal; shipboard cable; or wire and cable rated more than 2000 volts. Amount of lead which a manufacturer may use in the manufacture of such cable during March is limited to 9 per cent of the amount he used during 1944 in manufacturing these products. Beginning April 1, 1945, during any one calendar quarter, a manufacturer may use only 25 per cent of the amount of lead he used during 1944 in the manufacture of the permitted products. These provisions were issued in direction No. 63 to Controlled Materials Plan regulation No. 1.

LANTERNS AND TRAPS: Purchase orders for gasoline pressure lanterns and for mouse, rat and other animal traps bearing preference ratings lower than AA-3 may not be given preferential treatment, but must be treated as unrated orders. Flat wick lamp burners, for which preference ratings lower than AA-3 have not been valid since the issuance of direction 8 on June 14, 1944, remain subject to this restriction.

INDEX OF ORDER REVISIONS

Subject	Designations
Lead	M-38
Refrigerators, Ice	L-7-c
Tantalum Ore	M-63
Trucks, Power	L-112, 112-a
Price Regulations	
Building Materials	No. 188
Cabinets, Tool	GMPR
Castings, Manganese Steel	No. 235
Price Modifications	GMPR

L ORDERS

ICE REFRIGERATORS: Domestic ice refrigerator production quotas have been revised, bringing total authorized production in the first quarter of 1945 to 75,000 units in 18 plants. (L-7-c)

POWER TRUCKS: Deviations from approved standard models of industrial power trucks may be made if specifically authorized by WPB on form WPB-1319. (L-112, 112-a)

M ORDERS

TANTALUM ORE: Tantalum ore (tantalite) has been removed from import control. (M-63)

LEAD: Manufacturers and distributors of the following products containing lead are prohibited from further sales of such products after Feb. 28, 1945: Buttons, badges, emblems and regalia (except for sale to the Army, Navy, War Shipping Administration, Maritime Commission, and Veterans Administration); costume jewelry, novelties and trophies; tennis court markers; games and toys; statuary and art goods (except church goods). Allowable use of lead in storage batteries for civilian use during the first quarter of 1945 is increased from 50 per cent of the 1944 base period to 75 per cent, with subsequent allotments to be announced. Lead uses are also liberalized in List B of the order, including lead wool, lead for X-ray, abrasives and grinding wheels, industrial filters, rubber curing processes, plastics, zinc rolling cable covering, battery cables, insulator pins and cold drawing of wire.

A further tightening of restrictions has been imposed through redefinition of lead to include scrap lead and any alloy containing 50 per cent or more by weight of metallic lead. (M-38)

PRICE REGULATIONS

BUILDING MATERIALS: Individual adjustment provisions applying to manufacturers' maximum prices for a number of building materials have been incorporated in a single order (B-1 under regulation No. 188) and separated from similar provisions relating to manufacturers' prices for consumer goods. Two general groups of building material commodities are classified in the new orders: (1) Mechanical equipment, such as sheet metal work, furnaces, etc.; (2) mason materials, refractories, roofing and insulation material. (No. 188)

MANGANESE STEEL CASTINGS: An increase of 4 per cent in ceiling prices for all manganese steel castings becomes effective Feb. 12. (No. 235)

TOOL CABINETS: New metal tool cabinets that the government is turning over for civilian use have been provided with the following ceiling prices: $35 each at retail; $24.50 each on sales by wholesalers, f.o.b. shipping point; and $18.75 each on sales by Treasury Procurement to wholesalers. (GMPR)

PRICE MODIFICATIONS: All miscellaneous modifications granted on maximum prices issued under general maximum price regulation are now contained in Second Revised Supplementary Regulation 14, and nine separate regulations cover the following related classes of commodities and services: Foods and beverages; tobacco products; textiles, leather and apparel; chemicals, drugs and paints; transportation services; storage and terminal services; consumer goods; machinery and parts; metals and minerals and products. (GMPR)

Appointments-Resignations

B. C. Cooper has resigned as chief of the Lighting and Fixtures Section, Building Materials Division, War Production Board. The Lighting and Fixtures Section and the Electrical Materials Section have been combined to form the Electrical Products Section with W. J. Flynn as chief.

* * *

Dr. R. P. Fischolis has resigned as director of the Chemicals, Drugs and Health Supplies Division in the Office of Civilian Requirements, War Production Board.

* * *

David Novick of Easton, Pa., has been appointed associate director of the Bureau of Program and Statistics, WPB. He will continue as director of the Controller Division.

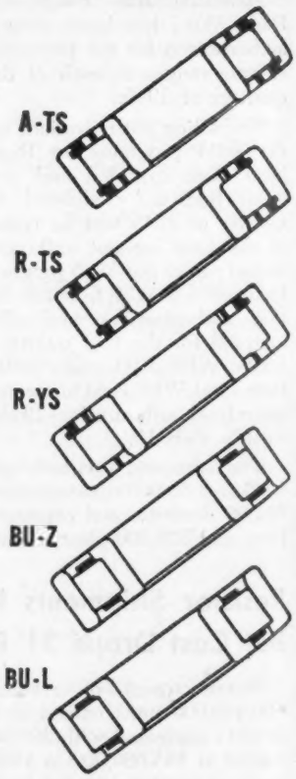
* * *

Oscar S. Cox has been appointed deputy administrator of the Foreign Economic Administration. He was formerly general counsel of FEA and is succeeded in that position by Alfred E. Davidson.

Hyatt Hy-Load Bearings are made in separable types as well as in self-contained units. In the separable bearings the inner races are the separable units in one instance and the outer races in the other. Thus, the component parts of every separable Hyatt Hy-Load type bearing of a given size are fully interchangeable. Every race fits every roller assembly.

Separable races may be assembled in one part of the shop and the rest of the bearing in another. When the sub-assemblies are brought together on the final assembly line the component bearing parts will fit correctly. No selection or matching required.

Every Hyatt A-TS, R-TS, R-YS, BU-Z and BU-L type bearing has this feature—and many others. Write for data.



HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION

Harrison, New Jersey • Chicago • Detroit • Pittsburgh • Oakland, California

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Development of incentive pay system in steelworks underway at Ford Motor Co. in attempt to reduce per-ton costs while increasing workers' hourly earnings. Fewer passenger cars scrapped during 1944

DETROIT

TWENTY-ONE years of operation of blast furnaces, open hearths, electric furnaces, merchant mills and later a continuous strip-sheet mill at the River Rouge plant of Ford Motor Co. have been productive of the full range of "ups and downs" which have characterized most of the nation's steel capacity. Designed to supply normally about half of Ford's steel requirements for automobiles, the mills have never operated on a cost basis commensurate with those of the steel industry, but have proved a valuable bulwark for steel supplies when outside markets were tight, along with employment for upward of 3000.

Neatness and cleanliness have always been musts with operators of the Ford steel plant, making it a show place for visitors. Two blast furnaces, with annual capacity close to 500,000 net tons, 183 Koppers-Becker by-product coke ovens with annual capacity of 1,182,920 net tons, ten open hearths rated at 742,-600 tons of ingots, two electric furnaces, soaking pits, all of which are now being replaced with new Swindell-Dressler bottom-fired and bottom-exhaust design calculated to handle approximately 100,000 tons a month (open hearths currently are pouring better than 65,000 tons a month), blooming mill, 10-inch, 12-inch, 14-inch, 18-inch and 32-inch bar mills, plus a 64-inch continuous sheet mill and an 84-inch cold mill, make up the complement of Ford steelmaking facilities.

For the past year, Ford officials and engineers, under the direction of Claude M. Nelles, have been making an intensive survey and analysis of the entire steel plant, in an effort to reorganize it on a more efficient basis. Comparable figures have been compiled for many years showing costs of production against costs involved if the material were to be purchased on the open market, and it was becoming increasingly apparent the margin between these two sets of figures was growing too wide, with "home" costs on the high side.

Some of this disparity was attributable to difficulties growing out of the unionization of the personnel with its attendant problems of supervision, administration and general worker efficiency. Hence the decision was made to work out detailed time studies of all operations involved in open-hearth and rolling mill departments and to compare such studies with the actual amounts of time consumed by the various jobs. This is being done with the full co-operation of the UAW-CIO, and final time study figures and costs and performance evaluations will be submitted to the UAW for approval.

Incentive Pay System Studied

The final goal was, of course, the perfection of an incentive pay system which would be productive at once of both greater income for the employes and lower per ton costs for the company. Obviously the only way this can come about is through increased man-effort, resulting in greater man-tonnage plus somewhat reduced total employment.

Tentatively a system was developed which would set up a certain base rate of pay for each classification of job. This rate is considerably lower than the present hourly rate which ranges from $1.10 to $1.90 per hour. However, to this rate is added a tonnage bonus which would have the effect of raising net hourly earnings above the present level, assuming a "normal" level of output. By exerting extra effort, earnings can be pushed still higher as tonnage increases, so that with the "full" tonnage output calculated to be possible by time studies, a man might earn 40 to 50 per cent more than his base rate plus "normal" output, but at the same time the company's per-ton costs would move progressively lower.

Full details of just what percentage of "normal" pay the base rate will be and the specific amounts of incentive bonuses, remain to be finally approved, but the base rate will likely be between 60 and 70 per cent of present hourly rates.

Concurrently some changes and additions are being effected at the Ford steel mills. As previously mentioned, new soaking pits are being installed. A new building, approximately 76 x 700 feet in size is being erected next to the open-hearth department and abutting the soaking pit building. New track installations and mold conditioning equipment in the structure will permit quicker stripping of ingot molds and far greater speed in readying specific types of molds for specific heats. In the past there has often been excessive delay in lining up molds for a heat, particularly if the heat was slightly "off" in analysis from the original specification and thus might have to be consigned to a different form of semifinished material. With the new facilities ingots can be handled in a maximum of 2 minutes between stripper and soaking pit.

As might be imagined, the scrapping of old automobiles in 1944 dropped to the lowest figure in at least 20 years, estimates by the National Automobile Dealers Association placing the figure at 703,458, or 30 per cent of the 1931-1940 annual average and 42.5 per cent of the lowest year in this period. Rate of automobile junking varies widely, pretty much in proportion to new car sales. It reached the recent peacetime low in 1933 when 1,654,369 vehicles were scrapped, and a high in 1931 of 2,973,279 units. Yearly average for 1931-1940 was 2,338,861, and if this figure had continued after Pearl Harbor,

JEEP, BEFORE AND AFTER: Members of an ordnance repair outfit at an Army Air Force bomber station in England converted the jeep at left into a more or less streamlined version of a peacetime jeep, shown at right. Only salvaged materials from junk piles were used to create the "jeep of the future"

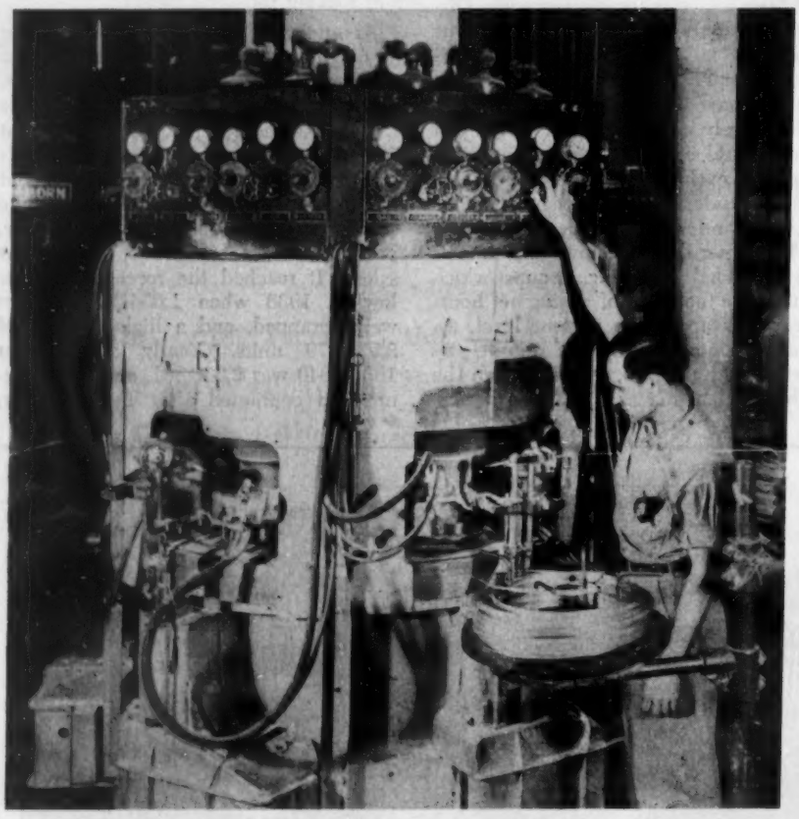
(Material in this department is protected by copyright and its use in any form without permission is prohibited)

about 7,000,000 vehicles would have been retired from the highways. However, 1942 records of the Public Roads Administration show a net decline in registrations of 1,889,903 units, while new car releases totaled only 224,398. Since each new car replaces one car which has been retired, this would bring the approximate gross scrapping rate for 1942 to 2,114,301. An unknown factor, of course, is the number of cars for which no licenses were obtained but which might not necessarily have been scrapped—probably a sizable number.

In 1943, scrapping is estimated to have amounted to 2,325,205, or 99.4 per cent of the average rate and, as mentioned above, it dropped precipitately in 1944. A further decline in scrapping is a logical expectation for 1945. As the nation's reservoir of passenger cars edges down to the bare minimum for essential travel, herculean efforts are being required to maintain and repair units still in service, and considerable credit is due dealers and repair agencies for keeping this work fairly well in hand.

Overall demand for replacement engine parts has snowballed to serious proportions, from the combined impact of unusually heavy civilian demands and the usual astronomical ordering of Army and Navy procurement agencies. The WPB is now surveying this situation, by selecting only a few of the parts for which shortages are most widely reported. For example, engine manufacturers have been asked for a listing of casting requirements for cylinder heads and blocks, by pattern number and engine model, with the name of the foundry on which orders have been placed and the monthly requirements for the first half of 1945, covering both production and spares. These data, now fairly complete, are being checked against engine schedules, summarized by foundries and turned over to the Steel Division of WPB which is checking the information against capacity of the foundries with a view to either spreading work among foundries or expanding foundry facilities.

On bearings, the approach is slightly different. Five major bearing manufacturers are supplying data to the Navy's Engine Parts Co-ordinating Office, while bearing orders from engine plants at which there are WPB plant scheduling officers are being reconciled with requirements. Analysis of the figures should indicate what expansion of bearing plants is needed. Tentative data show a total need for about 18,000,000 bearings monthly to meet military and civilian needs, compared with production (for the five companies) of about 12,800,000 monthly and potential output with full manpower of about 15,200,000.



METALLIZING: Cylinder head and barrel assemblies of Chevrolet-built Pratt & Whitney aviation engines are sprayed with a thin coating of aluminum in this metallizing machine to protect them against the corrosive effects of extremes of weather and the elements

A third method has been blueprinted to handle cylinder sleeves. The problem here was determined to be that the major supplier, Sealed Power Corp., Muskegon, Mich., was unable to handle orders for short runs because it was loaded up with large orders. So Ford Motor Co. has agreed to attempt to reopen a closed foundry capable of producing these centrifugally cast parts in long runs—4000 and up—and to machine them. This may release some of Sealed Power's capacity for shorter runs.

In addition, expansion of machining facilities at White Machine Co., Eau Claire, Wis., has been approved, with $50,000 worth of machine tools located quickly in surplus stocks. This will raise White's output of sleeves by 20,000-40,000 monthly, and arrangements have been made for Campbell, Wyant & Cannon Foundry Co. to provide the rough castings.

Pistons may be the next engine part to come in for similar treatment. Meanwhile, problems in other parts are being handled on a spot basis—for example, financial assistance to a manufacturer of flywheel magnetos, to break a tight situation in that product.

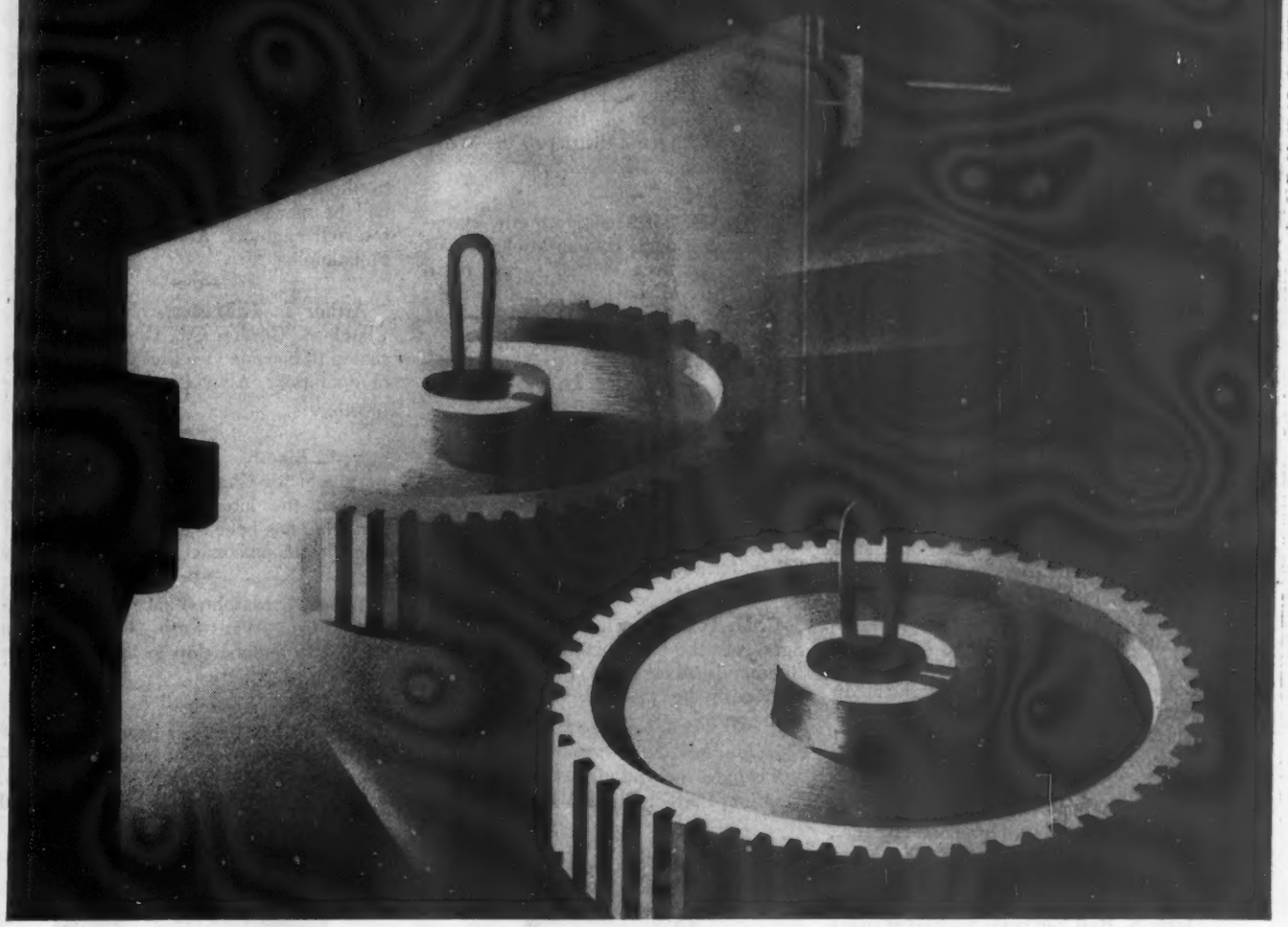
Chrysler Producing Grouser Units

Steel grouser assemblies for treads on M-4 tanks now in action in Europe are in production at the Evansville, Ind., ordnance plant operated by Chrysler Corp. Bolted to the track between treads, the grousers have the general appearance of an inverted railroad rail and serve to widen the present tread surface by 16 inches, reducing the ground pressure of a tank by more than 30 per cent—or from 13 to 8½ pounds per square inch of the operating tread. This provides much better flotation and improved traction, facilitating travel in snow and mud.

One set of grousers includes 175 pieces and each tank will require two sets. Initial production order is for 2000 sets, or enough for 1000 tanks. Several hundred persons will be engaged in the production operations 22 hours daily on a three-shift basis. Presses, furnaces and welding equipment have been installed, and approximately 100 tons of steel will be consumed every 24 hours.

Early models of the M-3 medium tank, with rubber treads, carried sets of steel grousers or cleats which could be bolted to the track to facilitate operation in soft ground. However, they were the same width as the treads and thus did not improve flotation perceptibly. Latest models of German tanks have tracks and treads which appear to be at least 20 inches wide and this doubtless gives them an edge in maneuverability over adverse terrain, even despite the heavy weight of the tank itself. Most U. S. medium tanks now carry a steel tread of the chevron type, so called because of the V-shaped raised gripper on the tread. Why the use of extension grousers, bolted to the tracks, has not been developed until this late stage is a source of some speculation.

Molybdenum steels require relatively high tempering temperatures and therefore are relatively free from internal stresses.



CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

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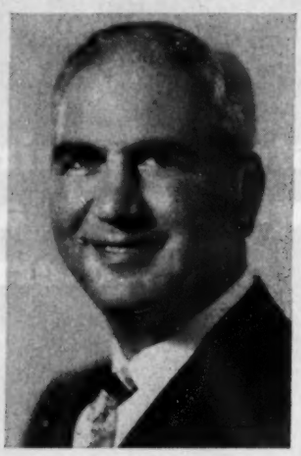
MEN of INDUSTRY

LOUIS G. GOETZ



EVERETT B. MICHAELS

Louis G. Goetz has been appointed vice president in charge of central operations of Trundle Engineering Co., Cleveland, management engineers. He will have overall supervision of the company's service activities in Ohio, Michigan and adjacent territory in Indiana, Kentucky, Pennsylvania and western New York.

—o—

The Purdy Co., Chicago, newly-organized to engage in a railway equipment business and allied enterprises, as well as a general scrap business, has announced that **Joseph R. Harrison** has become associated with the company as manager of the scrap department, and **C. A. Steffen** has joined the organization as general superintendent of all operations. Both men have been affiliated with Hyman-Michaels Co., Chicago, for many years, Mr. Harrison having been a department manager and Mr. Steffen superintendent of dismantling operations.

—o—

Robert T. Dunlap, vice president in charge of production, Wickwire Spencer Steel Co., New York, has been elected a director of the company.

—o—

R. S. Hudgins has been appointed plant superintendent, Kennametal Inc., Latrobe, Pa., succeeding **W. E. Newcomer,** resigned.

—o—

John N. Heil has been appointed manager of the new Wisconsin tank sales office of Heil Co., Milwaukee, which will be at 161 W. Wisconsin avenue, that city.

—o—

Richard Roley has been named public relations director of Wyeth Inc., Philadelphia, subsidiary of American Home Products Corp.

—o—

Russell S. Stamm has been named vice president, Kelley-Koett International Corp., newly-formed export subsidiary of Kelley-Koett Mfg. Co.

—o—

Appointments by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., are: **George S. Ryan,** assistant to vice president T. I. Phillips; **C. B. Dick,** manager, Feeder Division, and **George H. MacGilvray,** manager of the newly-established New England district of the Westinghouse Lamp Division.

—o—

Everett B. Michaels, formerly executive vice president, Hyman-Michaels Co., Chicago, has been elected to the presidency. Mr. Michaels is the son of the co-founder and present board chairman.

Other officers elected include: **W. J. Ross,** first vice president; **William Rosenthal, H. L. Purdy** and **W. A. Newman,** vice presidents, and **J. E. Michaels,** secretary-treasurer.

—o—

R. E. Stone, vice president of Graham-Paige Motors Corp., Detroit, has been elected secretary also, succeeding **A. H. Seiler,** resigned.

—o—

C. H. Tomkinson has been made manager of the Manufacturing Division, Simmonds Accessories Inc., New York. Previously he was director of planning and control.

—o—

Changes in the Industrial Relations Division, Perfect Circle Co., Hagerstown, Ind., include: **Irving Lacy,** assistant to the director of industrial relations; **Frank Trittschuh,** supervisor of the credit union and group insurance program; **Ted Green,** wage administration manager; **Kent Morse,** job analyst, and **Allen Smith,** assistant job analyst.

—o—

A. O. Thalacker has been elected vice president and general manager, Detrex Corp., Detroit. **E. W. Allison** succeeds Mr. Thalacker as secretary.

—o—

Harry Gillett has been elected president, Harvill Corp., Los Angeles, and **Jeffrey S. Granger** is board chairman. Previously Mr. Gillett was executive vice president.

—o—

Macy O. Teetor, executive engineer, Perfect Circle Co., Hagerstown, Ind., has been elected vice president of the fuels and lubricants activity of the Society of Automotive Engineers. During Mr. Teetor's temporary leave of absence due to illness, fuels and lubricants activity will be managed by **Dr. J. C. Geniesse,** research engineer, Atlantic Refining Co., Philadelphia.

—o—

Arthur L. LaMasters, chief engineer, Claude S. Gordon Co., Chicago, has resigned to become vice president in charge of operations, Alloy Casting Co., Champaign, Ill.

—o—

V. E. Blue has been named director of personnel for Chrysler Corp., Detroit, to succeed the late Charles T. Winegar. Mr. Blue has been with Dodge Bros. and Chrysler in personnel work for 29 years.

—o—

James A. Marohn, controller, Ohio Injector Co., Wadsworth, O., has been elected to membership in the Controllers Institute of America.

—o—

Edward F. Theis has been elected vice president in charge of refrigerator production for Philco Corp., Philadelphia. From 1938 until 1942 Mr. Theis had

JAMES MacBETH

Who has become associated with Max Solomon Co., Pittsburgh, in a sales capacity, noted in STEEL, Feb. 5, p. 104.

JOHN LUCAS

Who has been elected president and general manager of The Yoder Co., Cleveland, as mentioned in STEEL, Feb. 5, p. 103.

EVERETT C. GOSNELL

E. S. MORELAND

GEORGE A. FORT

served as works manager of the Philco Refrigerator Division. Leaving Philco in 1942, he became manager of the Indianapolis propeller plant of Curtiss-Wright Corp., New York.

—o—

Everett C. Gosnell has been appointed manager of the Chemical Division of Lukens Steel Co., Coatesville, Pa., and its subsidiaries, By-Products Steel Corp. and Lukenweld Inc. Mr. Gosnell joined Lukens in 1937 as chemical engineer.

—o—

Ivan F. Harlow has been appointed production manager, Inorganic Division, Dow Chemical Co., Midland, Mich. He succeeds **Dr. E. O. Barstow** who, as vice president of the company, has taken on increased responsibilities.

—o—

G. M. Guilbert has been appointed manager of the new regional office in Lansing, Mich. of Twin Disc Clutch Co., Racine, Wis.

—o—

E. S. Walker, sales manager of the Rolled Thread Die Co., Worcester, Mass., for the past three years, has resigned to establish a New England sales agency, handling all of that company's products. **Clifford T. Appleton** succeeds Mr. Walker as sales manager.

—o—

Miss Grace G. Glascott, for the past four years Ohio-Michigan regional director of the Wage-Hour and Public Contracts divisions, U. S. Department of Labor, will resign March 1 to open her own offices in Cleveland and Detroit as advisory consultant on wage and salary stabilization and other industrial problems.

—o—

Charles E. Kline has been named manager, Electric Welded Tubing Division, Brainard Steel Corp., Warren, O.

—o—

Joseph S. Brady has been made technical supervisor, Optimus Detergents Co., Matawan, N. J., and **A. C. Daly** has been appointed technical field representative.

—o—

Thomas I. Lane has become assistant to the central district manager, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. **E. W. Hoffman** has been appointed central district order supervisor and acting stock supervisor, and **A. B. McKelvy** has been made staff assistant.

—o—

E. S. Moreland has been named general sales manager, Pesco Products Co., Cleveland, a division of Borg-Warner Corp., Chicago. **Al E. Wilson** has been named assistant sales manager, Automotive Division, and **Ray G. Holt** and **C. M. Smith** have been appointed field representatives, while **J. Don Campbell,** field representative, has been given additional territorial assignments.

—o—

Three new directors of Koehring Co., Milwaukee, are: **R. Tuerk, J. R. Steelman** and **P. P. Graser.**

—o—

Pat McDonough, president, McDonough Steel Co., Oakland, Calif., has been appointed a director of Smaller War Plants Corp.

—o—

George E. Griffith has been made general traffic manager, Carborundum Co., Niagara Falls, N. Y., and **Karl S. Wright** succeeds Mr. Griffith as traffic manager of the Falls plant.

—o—

William K. Holt, president, William K. Holt Machinery Co., San Antonio, Tex., has been elected a director of Tyson Bearing Corp., Massillon, O.

—o—

Marvin A. Knoller, who has served 31 months with the Coast Guard, has resumed his duties as field manager in Wisconsin and Iowa for Electro Refractories & Alloys Corp., Buffalo, making Milwaukee his headquarters.

—o—

J. W. Jaspersen has been appointed district manager in Milwaukee for Toledo Steel Products Co., Toledo, O. The company's newly-created territory includes Wisconsin and part of the upper Michigan peninsula.

—o—

Albert E. Peterson has been appointed director of factory training activities, B. F. Goodrich Co., Akron, O. Separate education and recreation departments have been established, **Charles A. Mears** continuing to direct recreation activities.

—o—

George A. Fort has been appointed plant industrial engineer of the Gary works, Carnegie-Illinois Steel Corp., Chicago, and **Milton L. Weislogel** has been named assistant plant industrial engineer.

—o—

Perry C. McCollom has been named director of research, American Crucible Co., Shelton, Conn. Mr. McCollom resigned as head of the research laboratory, New Castle Refractories Co., New Castle, Pa., to join American Crucible.

—o—

Louis McGuire has been appointed sales engineer in Tennessee, Mississippi and Alabama for Copperweld Steel Co., Glassport, Pa. He will be located in Birmingham, Ala.

—o—

Walter T. Johnson, since last July acting district sales manager for the Chicago office, Columbia Chemical Division, Pittsburgh Plate Glass Co., Pittsburgh, has been appointed Chicago district sales manager.

—o—

E. C. Grimm has become associated with M. B. Speer & Co., Pittsburgh, in the Iron and Steel Division. Mr. Grimm was connected with H. F. Stocker & Co., Pittsburgh, for the past year, and prior to that was with Pittsburgh Crucible Division, Crucible Steel Co. of America, Midland, Pa., for 23 years.

—o—

Arch V. Ritts resigned as vice president of Amsler-Morton Division, Union Mining Co., Pittsburgh, on Jan. 1. Mr. Ritts plans to devote his time to his farm interests.

—o—

Roy P. Tooke has been appointed assistant chief engineer of the General Engineering Division, American Rolling Mill Co., Middletown, O.

—o—

William Howlett has been appointed special assistant in charge of public relations, Willys-Overland Motors Inc. H. A. Bruno and Associates were recently

JOHN R. MUNN

Who has been elected president, Elastic Stop Nut Corp. of America, Union, N. J., as announced in STEEL, Feb. 5, p. 103.

HARRY L. MYERS

Who has been made assistant personnel director of Allegheny Ludlum Steel Corp., Brackenridge, Pa., reported in STEEL, Feb. 5, p. 104.

THEODORE A. HARPER

Who becomes manager of cold finished bar sales, Grammer, Dempsey & Hudson Inc., Newark, N. J., noted STEEL, Feb. 5, p. 104.

appointed public relations counsel for the company.

—o—

Thomas Steel Co., Warren, O., has announced election of the following officers: **Clinton G. Thomas,** board chairman; **Charles H. Lewis,** president; **E. Milton Barber,** executive vice president; **Herman A. Mentall,** vice president in charge of operations; **William F. Rummell,** vice president in charge of sales; **Wilson D. Khonle,** treasurer, and **Alton B. Walker,** secretary.

—o—

Frederick W. Moore, formerly general purchasing agent for the Propeller Division of Curtiss-Wright Corp., Caldwell, N. J., has been appointed general production manager of the division. **Joseph R. Eggert** becomes plant manager of the organization's plant at Caldwell and Clifton, N. J., and **George L. Lang** has been made manager of the division's propeller plant in Indianapolis.

OBITUARIES . . .

Denis F. O'Brien, 80, board chairman and former president, A. P. Smith Mfg. Co., East Orange, N. J., died there Jan. 31. Mr. O'Brien became associated with the company at the time of its incorporation in 1896. He became president in 1910 and in 1941 retired in favor of his son, Hubert F. O'Brien.

—o—

Harvey M. Cushing, 69, chief mechanical engineer, Buffalo Niagara Electric Corp., Buffalo, and one of the nation's leading authorities on steam power generation, died Jan. 31 in Buffalo.

—o—

Herbert Harold Vreeland, 89, chairman of the board, Royal Typewriter Co. Inc., New York, died Jan. 31 in Palm Beach, Fla. For many years Mr. Vreeland was one of a group that controlled many of New York city's street and subway transit lines.

—o—

Oscar A. Swanson, 66, president, Swanson Tool & Machine Corp., Erie, Pa., died Jan. 26. Mr. Swanson was widely known in tool circles for his skill in the building of special tools.

—o—

E. Paul Webecke, 61, for the past seven years superintendent of the Los Angeles Division of United Aircraft Products Inc., died in Los Angeles Jan. 26.

—o—

Harry F. Black, service representative of the Allison Division of General Motors Corp., Detroit, has been reported as one of ten persons killed when a transport plane exploded in midair near Melbourne, Australia recently. He had been on loan to the Royal Air Force.

—o—

George M. Bartley, 56, steel products salesman in Cleveland for more than 30 years, died Jan. 31 in the office of Universal Steel Co., that city, where he had been employed the past five years.

—o—

L. Edward Crabtree, 64, considered one of this country's open hearth experts, died Jan. 17 in Granite City, Ill. For many years Mr. Crabtree was associated with American Steel Foundries, Chicago.

—o—

Robert Eddington Mulford, 49, retired president of the Pacific Ball Bearing Co., Los Angeles, died recently.

—o—

Paul R. Grimm, 80, one of the pioneers of the New York scrap and metal trade, died Feb. 2 in Rockaway Beach, N. Y.

—o—

Michael A. Oskey, 64, for the past two years supervisor of manufacturing, National Screw & Mfg. Co., Cleveland, died there recently. Mr. Oskey had entered the employ of National Screw when he was 12 years of age.

—o—

Ralph J. Edmiston, 62, for 27 years sales representative for United States Graphite Co., Saginaw, Mich., died Jan. 28 in Pittsburgh.

—o—

William Hubeli Waldron, 80, vice president and director of the John Waldron Corp., New Brunswick, N. J., died there Feb. 1. Mr. Waldron was the grandson of William Waldron, who founded the business in 1827. He became associated with the company in 1885 and was active in its management until 1924.

—o—

Charles N. Caldwell, 78, who retired in 1929 as general manager, Eastman Machine Co., New York, after holding that position for 30 years, died recently in Nutley, N. J.

—o—

Walter E. Carolin, 55, for 40 years associated with the management of the Enterprise Foundry Co., Detroit, died there Feb. 4.

—o—

Arthur M. Clark, 43, superintendent of the experimental department of Hercules Motors Corp., Canton, O., died there recently. He had been associated with the corporation for the past 25 years.

—o—

Carroll V. Hall, 50, co-ordinator of the personnel program at Cleveland Graphite Bronze Co., Cleveland, died Jan. 28 in that city.

—o—

Grover C. Weed, 58, sales engineer for the Thornton Co., sheet metal fabricators, died Feb. 2 in Cleveland.

—o—

L. A. Crow, 59, owner of the Crow Machine Works, Fresno, Calif., died Jan. 27 in that city.

—o—

Sydney A. Foster, 58, vice president, L. B. Foster Co., Pittsburgh, and for many years manager of the company's New York office, died recently.

California's Postwar Unemployment Estimated at 450,000 to 800,000

Reconstruction and Re-employment Commission finds state's readjustment will be difficult. Population has been enlarged and size and composition of labor force altered. Sees 3,200,000 jobs as maximum in first peacetime year

SACRAMENTO, CALIF.

CALIFORNIA may face the worst employment crisis in its history after the war. Joblessness is expected in the first postwar year for between 450,000 and 800,000 Californians, with most of the unemployment being in areas with most of the war jobs—San Francisco bay, San Diego and Los Angeles.

This is the finding of the California State Reconstruction and Re-employment Commission in Sacramento which has just released a comprehensive study of the postwar employment situation in a pamphlet, "How Many Jobs for Californians?"

"Of California, the war has asked more than of any other state," the commission stated. The state can never return to prewar job situations because its population has been permanently enlarged and the size and composition of its labor force altered. Even the type of jobs at which people work has been changed as shipyard, aircraft and other war plants sprung up over night where nothing else stood before. This is in direct contrast to the East's war manufacturing which in large degree took the place of civilian production with the result that workers can easily go back to their old jobs."

With the smoothest readjustment and the highest probable level of business activity in California there could be jobs for only 3,200,000 Californians the first year after demobilization, the commission found. But if peace readjustment is more difficult in the state than in the rest of the nation, available employment would only total 2,800,000. In either case, because of the state's larger population, unemployment would be higher than in April, 1940.

Job possibilities, broken down by industries, are seen as follows:

In the factories: Some 534,000 to 674,000 factory jobs are bound to disappear as the state can not re-create enough work all at once to replace the shipyard and aircraft factory positions. The net results will be, at most, 611,000 manufacturing jobs in 194x, little better than half the number of June, 1943, but 50 per cent more than the total in April, 1940.

In construction: An almost certain construction boom could create from 16 to 60 per cent more jobs building new homes for the thousands of new residents and building and repairing factories, streets, roads, railroads, stores, office buildings and public facilities. There could be 220,000 jobs in construction if best conditions prevail.

In mining: Renewal of gold mining and other minerals could boost mining jobs up to 47,000, half again as great as the 1943 mining employment.

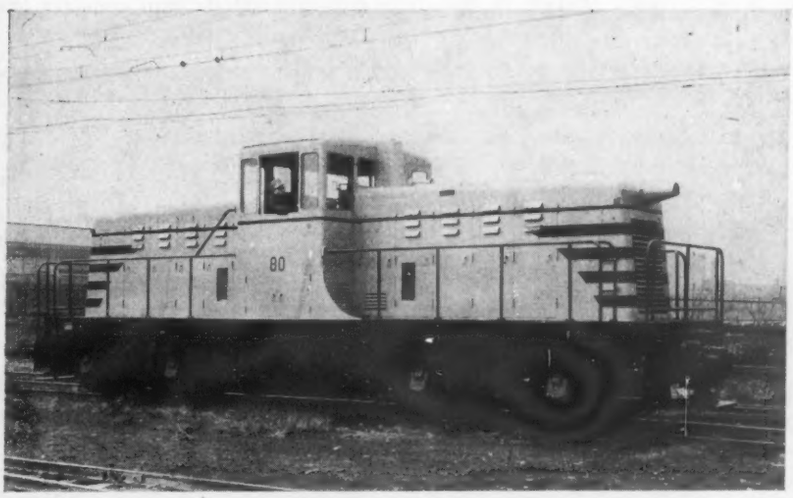
In government: Around 115,000 civilian employes will be laid off when hostilities cease. However, favorable conditions could see 310,000 government employes, a 31 per cent rise over April, 1940.

In transportation, communication and utilities: At best, 225,000 jobs will be available, with 205,000 under less favorable circumstances.

In trade and service: Half the new job opportunities will be in retail stores and in services for tourists and visitors. Around 273,000 new jobs could result from reopening of war-closed civilian businesses, representing a total of 1,441,000 jobs, 23 per cent more than in 1940.

The postwar plans of one county have been cited by the State Reconstruction and Re-employment Commission as an example of what other portions of the state will have to face.

San Bernardino county, where the Kaiser Fontana steel plant is located, believes the war-fostered steel industry may well become one of the pillars of the county's future.



DOES WORK OF THREE: This 500-horsepower, 80-ton diesel-electric, delivered to the Longview, Portland & Northern railroad, is doing almost as much work as the three steam locomotives with which it works. According to the railroad, the availability of this locomotive is 97.26 per cent, and fuel consumption is 6.8 gallons an hour

War Production Council Organized at Seattle

SEATTLE

Alarmed by general apathy which has resulted in lowered war production, civic leaders have formed a local War Production Council at the suggestion of War Production Board officials. Output by local plants of materials urgently needed in the speeded-up Pacific war has been falling short of requirements and the new council has assumed responsibility of taking corrective steps, according to Kenneth B. Colman, regional WPB director. An intensive voluntary mobilization of all elements of the community to speed production has been undertaken.

The council represents all types of war industry and includes members from business, labor, industry, professions.

Objectives of the campaign are:

To inform the public of the constructive work being performed by war production workers so that both the public and the workers themselves will be aware of the importance of the war workers to the successful outcome of the war.

To develop an enlightened and inspired community support of the war production program.

To give war workers reliable information regarding the importance of their individual production in supplying the men at the fronts with war materials.

To assist governmental agencies working to eliminate absenteeism and separation in war jobs.

To encourage stabilization of the employment of war workers.

To make each individual citizen feel his personal responsibility in the matter of producing for war.

A. F. Hardy, state director of the War Manpower Commission, has been named vice chairman.

WING TIPS

Jet propulsion and small gas turbines, while fascinating, will not become practical or economical for some years. Serious metallurgical and mechanical problems still must be overcome. May hold important postwar applications

MUCH that is going on behind the scenes currently in the aircraft field, both in respect to propulsion systems and the aircraft themselves, cannot be touched upon in any great detail, because of the obvious demands of military security which it must be admitted are often seriously stretched to cover subjects entirely familiar to the enemy, but which nonetheless must stand in the face of wartime necessity.

Of primary interest at the moment is the subject of jet propulsion and its blood brother the gas turbine. Officially announced is one type of jet-propelled plane, the P-59A Bell Aircraft, powered by two jet engines built by General Electric Co. from designs pioneered by British Group Captain Frank Whittle.

For those not familiar with the jet reaction-type engine, it may be described briefly as a rotary compressor mounted coaxially with a gas turbine, output of the compressor being directed to a combustion chamber and thence to the gas turbine. The blast from the combustion chamber serves both to drive the turbine and to provide a reactive force as it emerges from a rear jet or orifice sufficient to propel the plane. The engine is started by using external power to turn over the compressor, and once combustion has started the engine functions on its own.

The principal problem of design in the jet engine has been metallurgical—how to devise casings, turbine wheel buckets and other parts subject to the high temperature of combustion which would withstand the terrific heat. From the combustion chamber on, the equipment operates continuously at practically red heat, so a material must be used which can retain its shape dimensionally under heat and also withstand heat corrosion effects.

Using experience obtained in the design of exhaust-driven turbosuperchargers proved helpful. One of the most satisfactory alloys found for the turbine buckets was a material known as Vitallium, a Stellite-type alloy without the usual amount of tungsten and developed originally for dentures by the Austenal Laboratories. It is precision-cast to shape as described some months ago in STEEL, and cannot be machined. Recently it is understood specifications have been changed in the turbine bucket material from Vitallium to a forged Stellite analysis of a new type.

Intense Study Under Way

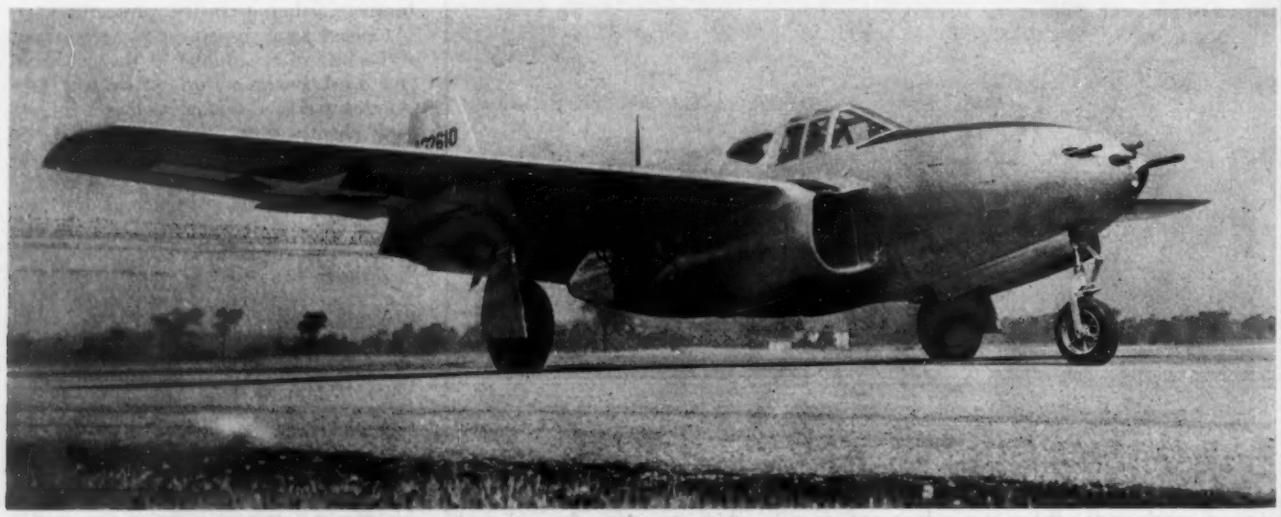
However, many other parts of the jet engine require special materials and special designs, and a full understanding of requirements and their satisfaction is still some distance off. The entire jet engine program, recently implemented by additional millions of dollars, is of staggering proportions. Allison Divison of General Motors has embarked on a program in this field. Westinghouse, Pratt & Whitney, Wright Aeronautical and several others also have received commitments.

The program has accelerated to such proportions that it may be appropriate to speculate on its immediate and possible postwar effect. Before so doing, however, it is pertinent to point out that the jet-propelled engine is just one form of the compressor-turbine type of system. It is entirely possible to connect the driveshaft to a propeller and thus combine the propeller and jet systems into one. Or it is possible to eliminate the jet feature altogether and recirculate the exhaust gases to the compressor, using their heat to increase the temperature of the compressor effluent. It is even possible to use some other fluid besides air as the circulating medium in this closed-cycle type of turbine. Monoatomic gases, or possibly a refrigerant fluid of the freon type, have been suggested. In this type of design, the combustion chamber is outside the system and is used to heat up the circulating medium to expand it before admission to the turbine.

Gas turbines are not new, particularly in the larger horsepower types such as 4500 and up, but as they become progressively smaller, the problems of design and construction mount in almost geometrical proportion. Hence it can be counted as some decades distant before anyone will have a successful gas turbine unit which can be mounted in the glove-box of your automobile to power the car, as some fanciful writer has envisioned.

Nevertheless, militarily it becomes necessary to spend vast sums for engineering and research so that every avenue can be explored and our technology matched with or kept ahead of the enemy. There is a suspicion the Germans may be far ahead of the U. S. in the gas turbine and jet propulsion fields, for they have jet-propelled fighter and interceptor planes in actual combat, while ours are still in the experimental or early construction stages.

One trouble with the jet-propelled plane is its inordinately high fuel consumption which in turn connotes inor-



Smooth lines of the Army Air Forces first jet-propelled fighter plane, the P-59A Airacomet, designed and manufactured by Bell Aircraft Corp., Buffalo, are shown in this photo. The propellerless plane is built low to the ground. The photo shows how snugly the right thermal jet engine hugs the fuselage. Also clearly outlined are the tricycle landing gear, the wide sweeping wing and some of the armament in the nose.
NEA photo

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...removes 35 cu. in. of S. A. E. 1045 steel per minute

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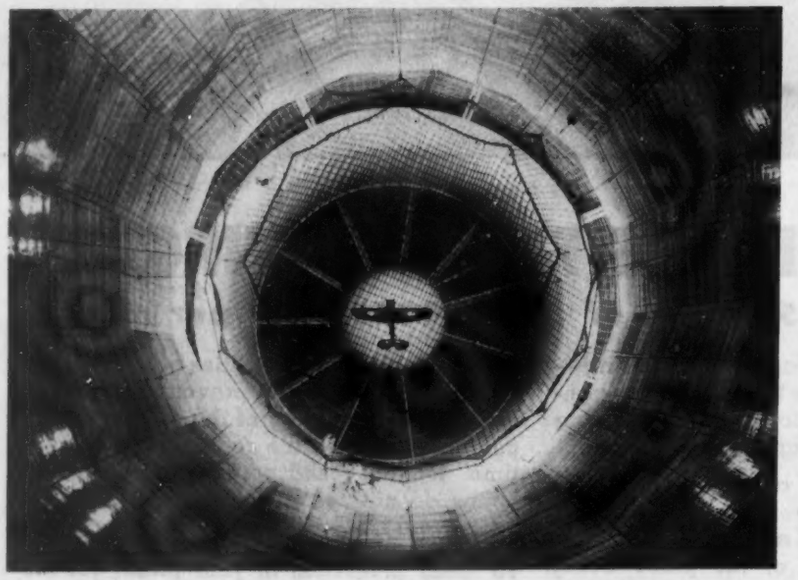
dinately short operational life. Flights of jet-propelled planes usually are measured in minutes and not hours, and 30 minutes have been considered a fair maximum until recently. The Nazi JP ships use the interesting technique of rising under power to a high altitude over the area being defended, then cutting the power and gliding or spiraling down over the area, retaining enough power so that they can get away with a short burst if pursued.

As speeds go up beyond the sonic range, aircraft encounter the mysterious compressibility phenomena about which not too much is known except that its effect is unpredictable. Propeller tip speeds on fighters and bombers were already approaching this range—one reason for the trend to four-bladed propellers, counter-rotating propellers, wider and shorter blades, etc. As propeller diameters are reduced, of course tip speeds are lowered.

In adapting the gas turbine system to driving propellers, several factors must be kept in mind. First, the bulk of the power generated by the rotating turbine, perhaps as much as 75 to 80 per cent, is required to drive the compressor, leaving only 20-25 per cent for the propeller. Second, the speed of the turbine at full power, perhaps 10,000 r.p.m. or better, requires bulky and complicated gearing to be stepped down to the normal propeller range. Turbine speeds are probably three times those of conventional radial and in-line aircraft engines. Third, it must be remembered the optimum practical efficiencies realized from the gas turbine, particularly in the sizes contemplated for aircraft, would not be much over 25 per cent, or perhaps somewhat lower than that realized from the reciprocating type of gasoline engine.

So, while there is a tremendous flurry of interest and excitement over the gas turbine and jet propulsion, even the most optimistic observers agree that practical, economical achievement is not yet in sight. There are serious metallurgical problems to overcome; there are concurrent mechanical problems. Beyond these, there are operational problems as yet not catalogued and defined, which must wait on more extensive operating and developmental experience. The amount of money now being appropriated for expediting the gas turbine and JP programs is no measure of their practicability or success. Rather it is more in the nature of insurance against being caught napping, and a gamble on what the future holds in store.

For anyone interested in gaining a working knowledge of earlier work in the field, the book, *Gas Turbines and Jet Propulsion for Aircraft*, by G. Geoffrey Smith, and published by Aerosphere Inc., New York, is recommended. It is primarily British in slant and context, but is the first work of its kind to appear. There is virtually no mention of any American developmental work carried on since the arrival of the Whittle engine designs in this country in 1942, which is understandable although regrettable.



VERTICAL WIND TUNNEL: Exact scale models of newly designed Army Air Force planes are launched into the upward airstream of the Air Technical Service Command's new vertical wind tunnel at Wright Field, O., by an engineer stationed on the observation platform halfway up the tunnel's test section. Looking from the base of the tunnel, this photo shows the polished maple surface of the lower test chamber, the nylon net into which models fall at the completion of the test, the free-flying model plane, and, at the top, the vents through which a 16-foot propeller sucks wind at speeds greater than 100 miles an hour. Previously impossible tests for airplane spin characteristics, terminal velocity studies, parachute research and experiments with helicopter rotor blades are being conducted in the new test facilities

New Glider Accommodates 16 Men, or 2-Ton Cargo

One of the youngest members of the Army Air Forces glider family, born of the battle experience of the CG-4A and the CG-13A, is the new CG-15A, now going from the production lines of the Waco Aircraft Co.'s plant at Troy, O., to the fighting fronts of the world.

Product of three and a half years of work, the new motorless transport bears a strong family resemblance to the CG-4A but differs in having a strongly-reinforced nose section, clipped wings, and a landing gear with improved shock-absorbing characteristics.

These changes, proposed by the engineering division of the Air Technical Service Command and executed by Waco, "up" the useful load of the glider 500 pounds over that of the CG-4A, increase the towing speed from 150 to 180 miles an hour, and provide better crash protection for the glider crew.

An externally braced high-wing glider with fuselage of steel tubing, the CG-15A has a framework covered with cotton fabric, and wings and tail surfaces of wood. It has a wing spread of 62 feet 2½ inches and an overall length of 48 feet, 9⅞ inches.

Large enough to accommodate 16 men, including the pilot and co-pilot, the glider can carry an alternate 4000-pound load of rolling mechanized equipment. Heavy or bulky equipment is loaded through the nose, which opens like a giant mouth to receive the freight.

New ATSC Chart Offered Aircraft Scrap Dealers

In recognition of the importance of the industrial scrap dealer in keeping up a steady flow of materials for vital war production, a chart has been prepared by the Air Technical Service Command, Wright Field, O., to aid dealers in having their names placed on the AAF industrial scrap bidders list.

As pointed out in the chart, which was prepared by the readjustment division of the ATSC, scrap dealers may be placed on bidders lists by writing to the ATSC district office with which they wish to do business. If the dealer is located on the border of two or more districts, and wishes to cover them both, he may write to these districts with which he wishes to do business. Names on bidders lists are regularly circularized when scrap is available, and it is stressed that the dealer should state the type of items in which he is interested.

Headquarters of the ATSC's districts are located at New York, Atlanta, Detroit, Chicago, Wichita and Los Angeles.

...plus Remote Control in a HOBART

The right electrode for a specific application, when applied with PROPER CONTROL OF HEAT, will produce the desired properties in the weld. Guess work doesn't count, for example, in the welding of Stainless Steel as illustrated above, spoilage cannot be tolerated because it is one of the more costly metals and rejects mean a considerable loss in both time and material.

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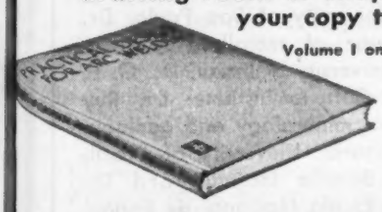

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BUY WAR BONDS!

Machine Tool Co. Making Parts for Military Vehicles

Lodge & Shipley, Cincinnati, operating special products division for making components under subcontract

THE LODGE & Shipley Machine Tool Co., Cincinnati, is now operating a special products division where transfer cases for trucks required for war uses are being processed and manufactured on a subcontract basis.

The transfer case is described as an auxiliary gear box which transfers the drive from the center line of the engine clutch and transmission to the offset center line of the propeller shafts necessary on all trucks equipped with front driving axles because the front axle propeller shaft is located alongside the engine oil pan or directly under it.

On what are familiarly known as six by six trucks, those with six wheels and the four rear wheels driving, transfer cases are used to allow the use of a propeller shaft for each of the two rear axles. On most trucks larger than a quarter-ton four by four, four wheels and all four wheels driving, the transfer case provides an additional gear reduction of around two to one, making it a two-speed transfer case.

Transfer cases produced by Lodge & Shipley's special unit are provided with a power take-off to supply power for cranes, winches, and other special equipment mounted on or built into various types of vehicles.

In addition to supplying transfer cases to truck and transport manufacturers such as Mack, Brockway, Diamond T, Corbitt, White, and Ward-La France, the special products division has engaged in production of parts for aircraft propellers and aircraft electric motors. However, 85 per cent of current production is devoted to transfer cases.

The Lodge & Shipley contract is a subcontract from the Standard Steel Spring Co., Coraopolis, Pa., which has a subcontract from the Timken Detroit Axle Co., Detroit. The Timken master design is used by Lodge & Shipley.

BRIEFS . . . .

Wyndale Mfg. Corp., Indianapolis, has arranged for the manufacture and sale of forgings of Wyndaloy-Chace 720 alloy.

—o—

Perfect Circle Co.'s plant at Tipton, Ind., has completed eight years and more than 2,975,000 man-hours of continuous operations without loss of time for a single employe as a result of an accident on the job.

—o—

Associated Engineering & Research Companies, an organization of inventors, engineers, research men and market analysts, have established offices at 150 Broadway, New York.

—o—

Weatherhead Co., Cleveland, has purchased a large, brick factory building at Warsaw, Ind., where it plans to start manufacture of precision parts.

—o—

Crowe Name Plate & Mfg. Co., Chicago, is now known as Croname Inc.

—o—

The Aro Equipment Corp., Bryan, O., has appointed the following jobbers for ARO industrial pneumatic tools: The Hayden Supply Co., Grand Rapids, Mich., the Industrial Specialties Co., Portland, Oreg., Erie Industrial Supply Co., Toledo, O., and C. W. Marwedel, San Francisco.

—o—

Missouri Pacific System has received permission from the U. S. District Court at St. Louis to spend $8,645,075 for improvements in 1945.

—o—

Schwitzer-Cummins Co., Indianapolis, has been purchased by the Airtemp divi-

BRAZILIAN MISSION: Currently touring technical and scientific laboratories throughout the country, members of a Brazilian mission view engineering laboratories at Battelle Institute, Columbus, O. Shown in the picture are, left to right: Dr. Homero Barbosa de Assis Martins, professor of communications, Escola Politecnica of the University of Sao Paulo; Dr. Filinto Antonio Guerra, professor of inorganic chemistry at the same school; Dr. J. Silgado Bueno, economist with the Inter-American Development Commission, Washington; Dr. Paulo Guimaraes da Fonseca, professor of industrial chemistry, Escola Politecnica of the University of Sao Paulo; Dr. Alono da Silveira, professor of metallurgy, Escola Nacional de Engenharia, University of Brazil; Dr. O. E. Harder, assistant director, Battelle Institute; Dr. Ruy de Lima e Silva, professor of mineralogy and geology, Escola Nacional de Engenharia, University of Brazil; Clyde Williams, director, Battelle Institute; and Dr. Mauricio Joppert da Silva, Escola Nacional de Engenharia, University of Brazil, and chief of the mission

INSPECTS ROCKET TUBES: Irving S. Olds, chairman, United States Steel Corp., New York, inspected operations of subsidiaries in the Gary district, Jan. 18, in connection with his visit to address the Gary Chamber of Commerce. Here Mr. Olds, right, is shown with Leo J. Mason, vice president, National Tube Co. in charge of the Tubular Alloy Steel Division, observing the rocket tube shipping line at the Tubular Alloy plant in Gary

sion of the Chrysler Corp., Detroit, which will continue to use the plant for the manufacture of stokers and allied products. Personnel of the Indianapolis plant will be retained.

—o—

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will relinquish on June 30, 1945, the management of the U. S. Naval Ordnance Plant at Center Line, Mich. After that date the plant will be directed by the U. S. Navy Department.

—o—

Precision Welder & Machine Co. has been formed by T. Embury Jones and E. W. Forkner, both formerly of the welder division of Federal Machine & Welder Co., Warren, O. The new firm will be located at English and Neave streets in Cincinnati.

—o—

Industrial Steels Inc., and its newly formed subsidiary, Stainless Surface Hardening Co., both of Cambridge, Mass., have appointed The John Mather Lupton Co., New York, as advertising and marketing counsel.

—o—

The Gerotor May Corp., Baltimore, has purchased the Cotner Machine Products Co., Logansport, Ind., manufacturers of air and hydraulic equipment for machine tools and other industrial applications.

—o—

The Munitions Department of the Canadian government has announced amalgamation of its gun production and naval armament and equipment branches. Frank M. Ross becomes director general of the newly created Armament, Supply and Naval Equipment Production Branch.

—o—

The General Pacific Corp., Los Angeles, has published a new catalog, "The Buyer's Encyclopedia," giving complete data on fire extinguishers and safety equipment.

—o—

Elwell-Parker Electric Co., Cleveland, is offering a free, illustrated booklet entitled "Lady, Will You Give a Lift?" which explains how easy it is for women to operate power industrial trucks.

—o—

Pere Marquette railway, Cleveland, has authorized a $50 million issue of 35-year bonds to be offered at competitive bidding to refinance all of the company's first mortgage debt.

—o—

Standard Conveyor Co., North St. Paul, Minn., has issued a new catalog that serves as a reference for all conveyor needs.

—o—

The Specialties Mfg. Co., Bloomfield, N. J., has been renamed Kidde Mfg. Co.

—o—

Kobe Inc., Huntington Park, Calif., announced that its stockholders have approved the transfer of assets and business of the company to Dresser Industries Inc., Cleveland, for 34,594 shares of Dresser stock.

—o—

Chicago Association of Commerce has issued a fifth edition of a directory listing United States war organization offices in Chicago as of Jan. 1, 1945.

Lone Star Steel Co. Will Resume Mining Iron Ore

Texas firm has contract to ship 1000 tons of ore daily to iron producer in Birmingham district

MINING of iron ore is expected to be resumed soon by the Lone Star Steel Co., Daingerfield, Tex., which recently contracted to ship 1000 tons of ore a day for an indefinite period to an iron producer in the Birmingham district.

Mining surveys are claimed to show enough ore deposits in East Texas to supply southwestern industry for 100 years. Ores in this district contain about 45 per cent iron. About 50 million tons of iron ore lie within 4 miles of Lone Star's blast furnace.

The plant of the Lone Star Steel Co. at Daingerfield represents an expenditure of $25 million; another $35 million awaits the sanction of a steelworks by the War Production Board. The plant includes a 1200-ton blast furnace which has not yet been blown in, an ore beneficiation plant 3 miles east of the plant site and 78 by-product coke ovens, the fuel being handled by conveyors from the screening station to the stockhouse bins. The plant was built under the supervision of J. V. W. Reynders, New York.

Plans are being considered for the opening of a water route from Daingerfield to New Orleans. The proposed route as surveyed would go by way of Big Cypress bayou and Caddo lake to Shreveport, La., and from Shreveport by way of the Red river to the Mississippi.

Officers of the Lone Star Steel Co. include: J. W. Carpenter, president; W. W. Lynch, executive vice president; C. H. Cadenhead, secretary; and, Nathan Adams, treasurer. General offices of the Company are at Dallas, Tex.

Carnegie-Illinois Ohio Works Completes Fiftieth Year

Carnegie-Illinois Steel Corp.'s Ohio Works at Youngstown, O., has completed its fiftieth year of steelmaking.

This United States Steel Corp. subsidiary has shown a steady growth since its bessemer converters first lit the skies over Youngstown 50 years ago, and during that period played a winning role in three major wars. Tonnage figures for the three wars have risen steadily from 200,000 in the Spanish-American war, 2,400,000 in World War I, and 7,100,000 since Pearl Harbor.

There was no formal celebration in observance of the anniversary on Feb. 4, but a full day's work was the program for the day.

THE BUSINESS TREND

Order Backlogs Up, Production Off

INDUSTRIAL production in recent weeks has tended downward due primarily to the shortage of industrial gas supply and the bogging down of transportation which forced the backing up of goods at many war plants. In contrast to the somewhat lower production schedules, the backlog of unfilled orders in most industrial lines continues the steady upward trend noted throughout January.

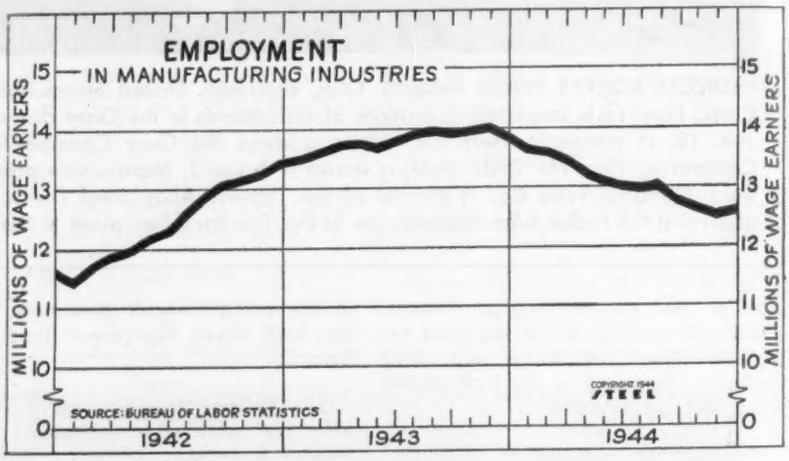
In the latest period declines were recorded in steel ingot production, electric power consumption, revenue freight carloadings and bituminous coal output. The steel industry's ingot operations have been receding since the first of the year from the 95 per cent average rate held throughout the closing months of last year. Currently the rate is about 90 per cent. Growing manpower shortage, inadequate stocks of coking coal and scrap, plus industrial gas shortage, may prevent the steel industry from reaching capacity output the remainder of the winter months.

PRODUCTION SCHEDULING — With the increasing delays in deliveries of component parts threatening to delay production of vital war items, procurement claimant agencies have instructed their contracting officers to place promptly contracts covering their expected needs, at least through 1945, wherever practicable. In the future all prime contracts shall contain clauses requiring that: 1. Prime contractors place all necessary subcontracts and purchase orders promptly with their suppliers to assure receipt of needed materials and components in time for scheduled deliveries called for in the prime contracts; 2. the same clause to be inserted in the subcontractor's orders to his suppliers.

EMPLOYMENT — Factory employment, although lower than last year, gained slightly during December and January, according to the War Manpower Commission. Expansion of some critical war programs, realization that the war is by no means over, and threat of inducting into military service those who entered civilian jobs from war plants, combined to reverse the downward trend in factory employment underway since November, 1943. Current WMC's estimate places immediate manpower needs at about 180,000 workers in 1500 highly important "must" plants that are behind production schedules.

STEEL CASTINGS—Shipments of steel castings during October, including those produced for sale, totaled 197,772 short tons, an increase of 4 per cent over the September output, and about equal to the comparable 1943 monthly production. About 76 per cent of the October, 1944 production went into commercial channels. Of the October steel castings output, 142,458 tons were of carbon steel and 55,314 tons of alloy. The total shipments consisted of 94,135 tons produced by electric furnaces, while production in other than electric furnaces amounted to 103,637 net tons.

Unfilled orders at the end of October amounted to 953,344 tons, of which 663,733 tons, or 70 per cent, were orders for carbon steel castings, and 289,611 tons were alloy.



Factory Employment

	1944	1943	1942
January	13,669,000	13,503,000	11,456,000
February	13,594,000	13,633,000	11,654,000
March	13,406,000	13,727,000	11,821,000
April	13,173,000	13,735,000	11,988,000
May	13,020,000	13,700,000	12,127,000
June	12,985,000	13,827,000	12,282,000
July	12,924,000	13,911,000	12,564,000
August	12,942,000	13,990,000	12,869,000
September	12,802,000	13,935,000	13,079,000
October	12,659,000	13,965,000	13,166,000
November	12,568,000	14,007,000	13,267,000
December	12,600,000†	13,878,000	13,474,000

†Estimated.

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	91	93.5	95.5	100.0
Electric Power Distributed (million kilowatt hours)	4,539	4,577	4,427	4,524
Bituminous Coal Production (daily av.—1000 tons)	1,950	1,993	1,385	2,138
Petroleum Production (daily av.—1000 bbls.)	4,723	4,727	4,679	4,400
Construction Volume (ENR—unit $1,000,000)	$28.7	$8.8	$28.8	$35.5
Automobile and Truck Output (Ward's—number units)	20,770	20,765	19,735	19,245

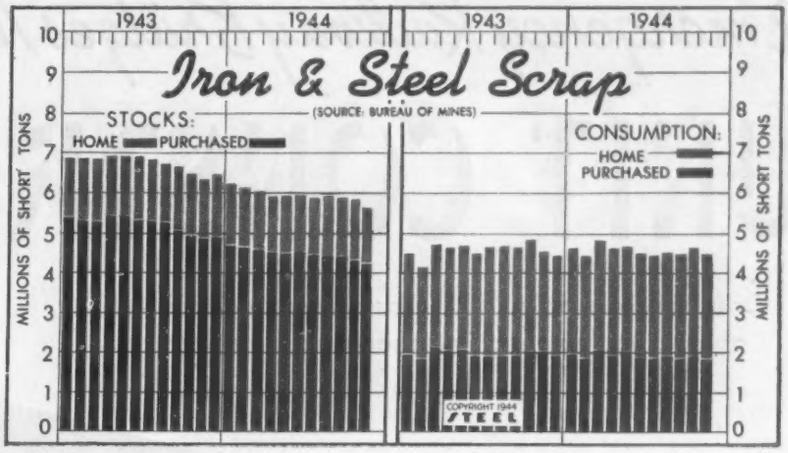
*Dates on request.

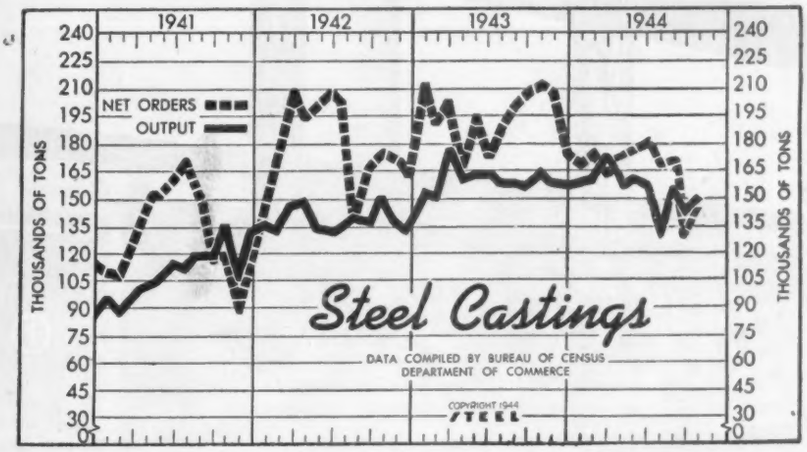
TRADE				
Freight Carloadings (unit—1000 cars)	755†	759	683	806
Business Failures (Dun & Bradstreet, number)	16	16	19	33
Money in Circulation (in millions of dollars)‡	$25,290	$25,775	$25,326	$20,534
Department Store Sales (change from like week a year ago)‡	+11%	+14%	+35%	+15%

†Preliminary. ‡Federal Reserve Board.

Iron and Steel Scrap
Bureau of Mines
(Gross Tons—000 omitted)

	Consumers, Stocks		Total Consumption	
	1944	1943	1944	1943
Jan.	6,214	6,877	4,616	4,492
Feb.	6,134	6,871	4,414	4,178
Mar.	6,027	6,850	4,827	4,787
Apr.	5,932	6,918	4,629	4,642
May	5,966	6,905	4,683	4,723
June	5,991	6,916	4,460	4,493
July	5,909	6,860	4,423	4,670
Aug.	5,975	6,778	4,533	4,686
Sept.	5,953	6,613	4,471	4,657
Oct.	5,832	6,456	4,684	4,830
Nov.	5,624	6,391	4,527	4,581
Dec.	.....	6,448	.....	4,449
Mo.Ave.	.....	6,740	.....	4,599



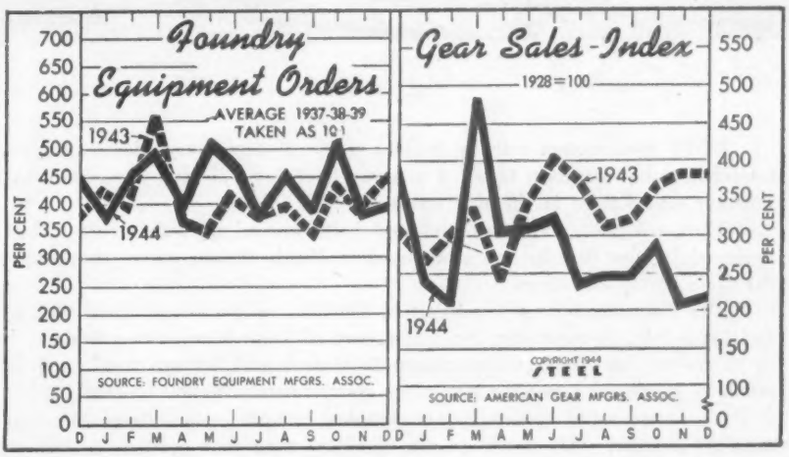


Commercial Steel Castings
(Net tons in thousands)

	Orders		Production	
	1944	1943	1944	1943
Jan.	167.7	213.1	159.8	154.7
Feb.	173.6	191.2	161.4	151.5
Mar.	162.6	202.7	174.6	176.5
Apr.	175.1	165.8	155.8	161.4
May	177.0	192.5	161.8	163.8
June	181.8	171.8	157.4	163.9
July	169.9	187.3	131.9	158.8
Aug.	171.3	200.6	154.9	158.8
Sept.	129.8	214.1	144.5	157.8
Oct.	146.1	211.3	150.7	163.9
Nov.	.....	209.3	.....	158.8
Dec.	.....	173.6	.....	158.6
Total	.....	2,333.4	.....	1,928.6

Foundry Equipment and Gear Sales

	Monthly Average (1937-38-39=100)			Index (1928=100)		
	1944	1943	1942	1944	1943	1942
Jan.	442.8	429.8	532.7	246	268	288
Feb.	378.3	399.5	567.9	214	303	353
Mar.	456.8	562.7	1122.4	485	334	455
Apr.	385.7	362.7	1089.3	308	240	378
May	503.9	348.9	653.6	305	342	421
June	466.1	413.6	774.0	328	401	378
July	375.8	379.4	800.8	242	374	344
Aug.	450.5	390.4	510.8	247	312	380
Sept.	388.0	346.6	446.4	248	320	351
Oct.	526.5	436.6	540.6	293	368	268
Nov.	369.5	388.0	338.8	209	387	359
Dec.	379.4	442.8	382.5	219	387	300
Avg.	426.9	440.3	646.7	279	336	355


Foundry Equipment Orders
AVERAGE 1937-38-39 TAKEN AS 10
1943
1944
PER CENT
SOURCE: FOUNDRY EQUIPMENT MFGRS. ASSOC.
Gear Sales-Index
1928=100
1943
1944
PER CENT
COPYRIGHT 1944 STEEL
SOURCE: AMERICAN GEAR MFGRS. ASSOC.
D J F M A M J J A S O N D D J F M A M J J A S O N D

FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$10,955	$11,119	$11,374	$11,265
Federal Gross Debt (billions)	$233.9	$233.3	$232.4	$178.7
Bond Volume, NYSE (millions)	$41.9	$58.4	$79.7	$94.2
Stocks Sales, NYSE (thousands)	8,546	6,818	7,873	4,265
Loans and Investments (millions)†	$59,620	$59,635	$59,737	$50,287
United States Government Obligations Held (millions)†	$44,554	$44,393	$43,803	$36,575

†Member banks, Federal Reserve System.

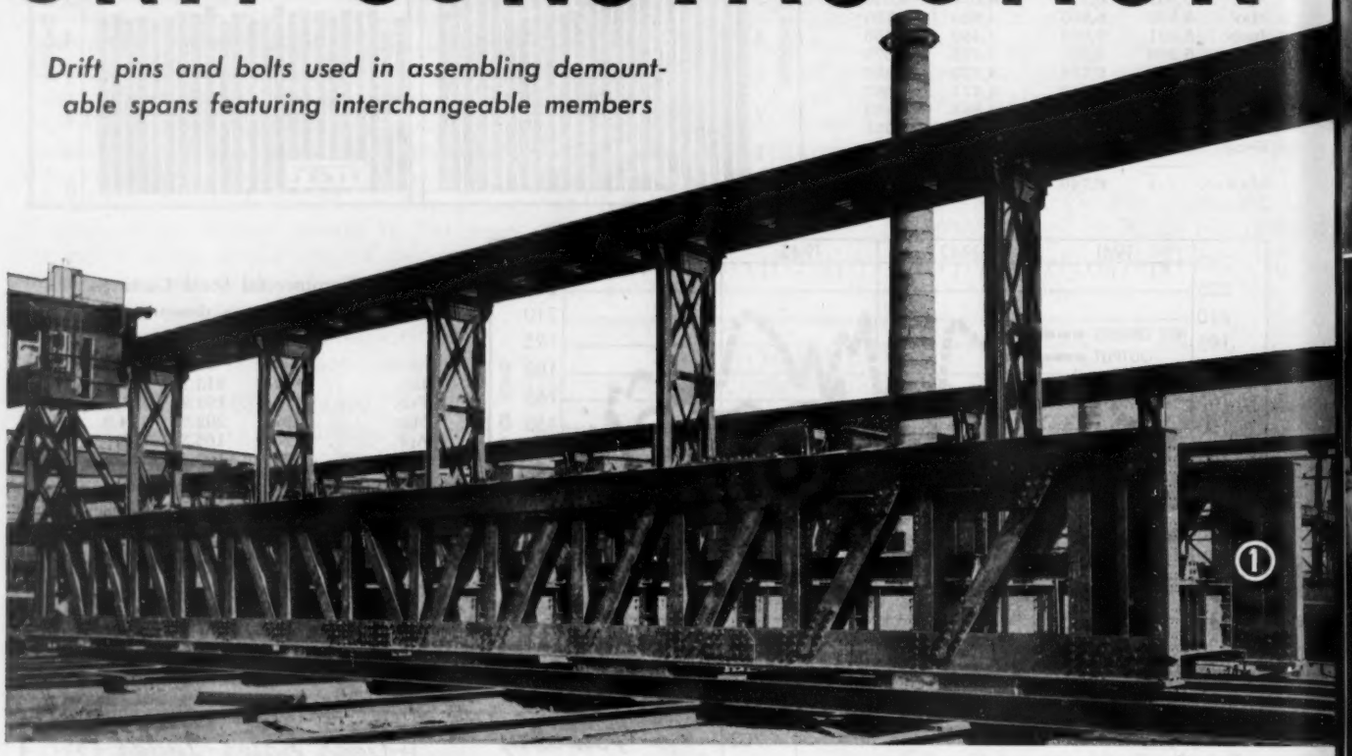
PRICES

STEEL's composite finished steel price average	$57.55	$57.55	$56.73	$56.73
All Commodities†	104.7	104.8	104.7	103.1
Industrial Raw Materials†	115.3	115.8	115.7	112.7
Manufactured Products†	101.6	101.6	101.3	100.4

†Bureau of Labor's Index, 1926 = 100.

Emergency Railway Bridges Made by UNIT CONSTRUCTION

Drift pins and bolts used in assembling demountable spans featuring interchangeable members



UNIT construction railway bridges made of temporary, demountable truss spans with interchangeable members fastened together have been of vital importance in rushing wrecked railways into service in the war zones.

They are built with drift pins and bolts instead of with rivets. The spans, originally designed by the British, first were used in North Africa, where they won the approval of the U. S. Army engineers.

The Fabricated Steel Construction Division of Bethlehem Steel Co., at five of its fabricating works, is producing the major part of these knock-down bridges, having completed or in the process of completion almost 1000 deck and through spans, and 250 sets of special auxiliary members, involving a total of approximately 50,000 tons of steel.

To insure rapid assembly and complete interchangeability of identical parts, members must fit together with much greater accuracy than that needed in ordinary riveted bridge construction. The drift pins are machined to a tolerance of 0.005-inch, while holes which receive the fastenings are centered with an accuracy of 0.001-inch and must be within 0.008-inch of the specified diameter. Parts made in American shops must be interchangeable with British made parts. As a test, the chords of one span were fabricated at Bethlehem's Pottstown Works, its web members at Bethlehem, floor beams at Leetsdale and stringers at the Rankin Works. The result was a perfect fit.

Chord members are welded in the shop and shipped in 15 and 20 foot lengths for field assembly into spans ranging from 55 to 85 feet. Bridges of greater length must be constructed with intermediate piers. Two, three, or four trusses are used, according to the length of the span and the load to be carried. Trusses may be assembled into both deck and through spans and may be used for narrow or standard gage tracks which, in through spans, may be laid at high or low elevation. Auxiliary members of special design are used under certain conditions, such as in skewed abutments.

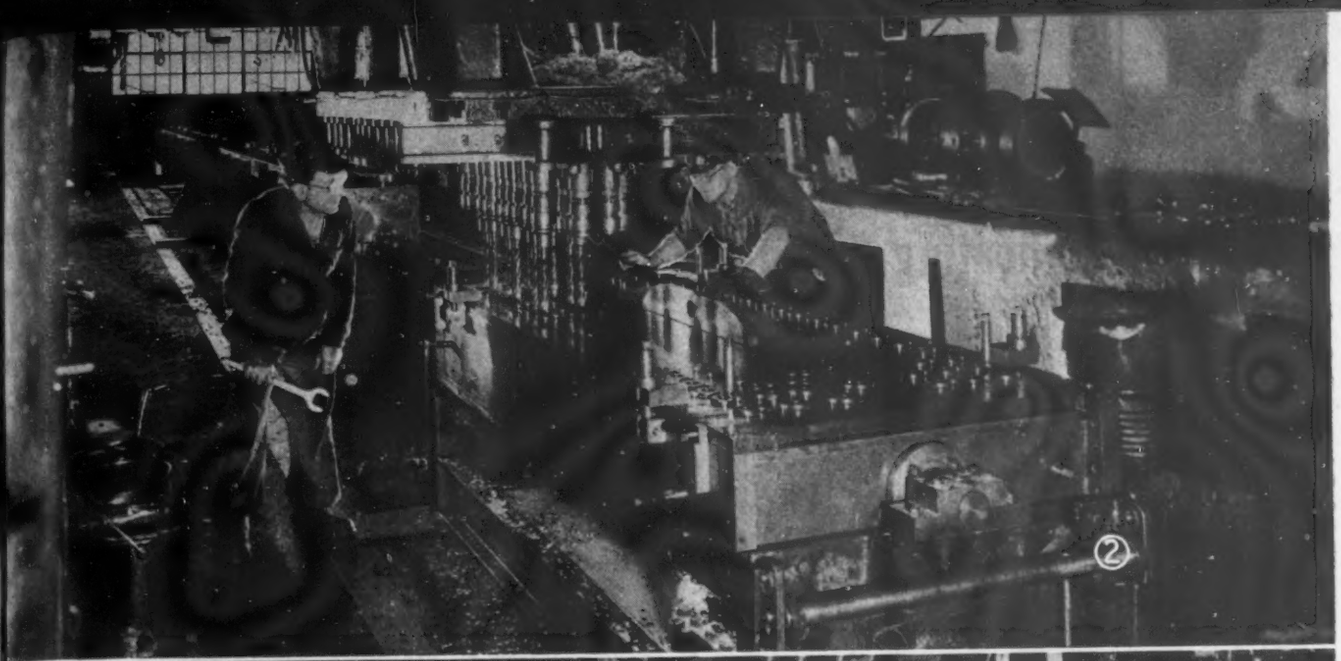
To facilitate assembly and interchangeability, chord sections may be used either as top or as bottom chords, and may be turned end for end. Diagonals and the verticals may be used any place in the assemblies and may be turned end for end and still make a fit.

Fig. 1 — Assembly of through spans for unit construction bridge first used in the North African military campaigns

Fig. 2—Reaming jig for production of end posts, which are interchangeable with similar British-made bridge units

Fig. 3—Reaming chord in jig with multiple drill fixture at Bethlehem Steel Co.'s Pottstown Works

Fig. 4—Welding chord sections in special jig. They are shipped in 15 and 20 foot lengths



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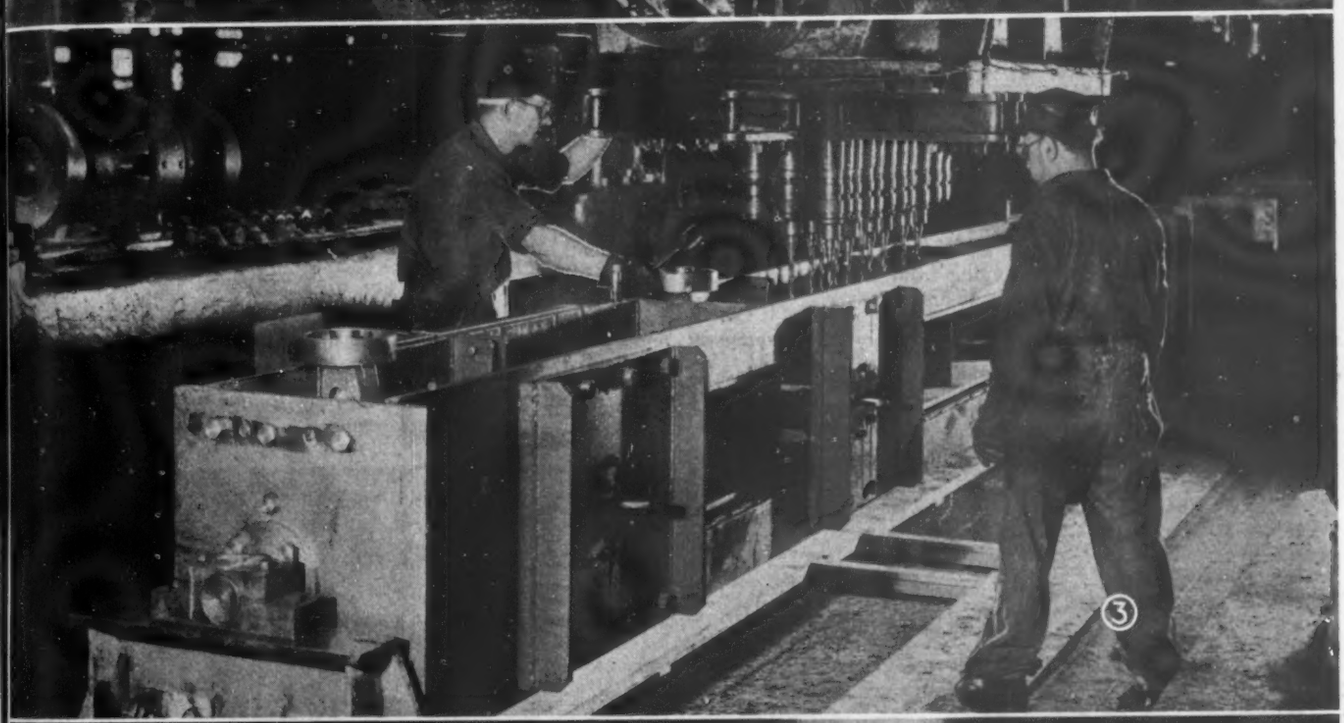

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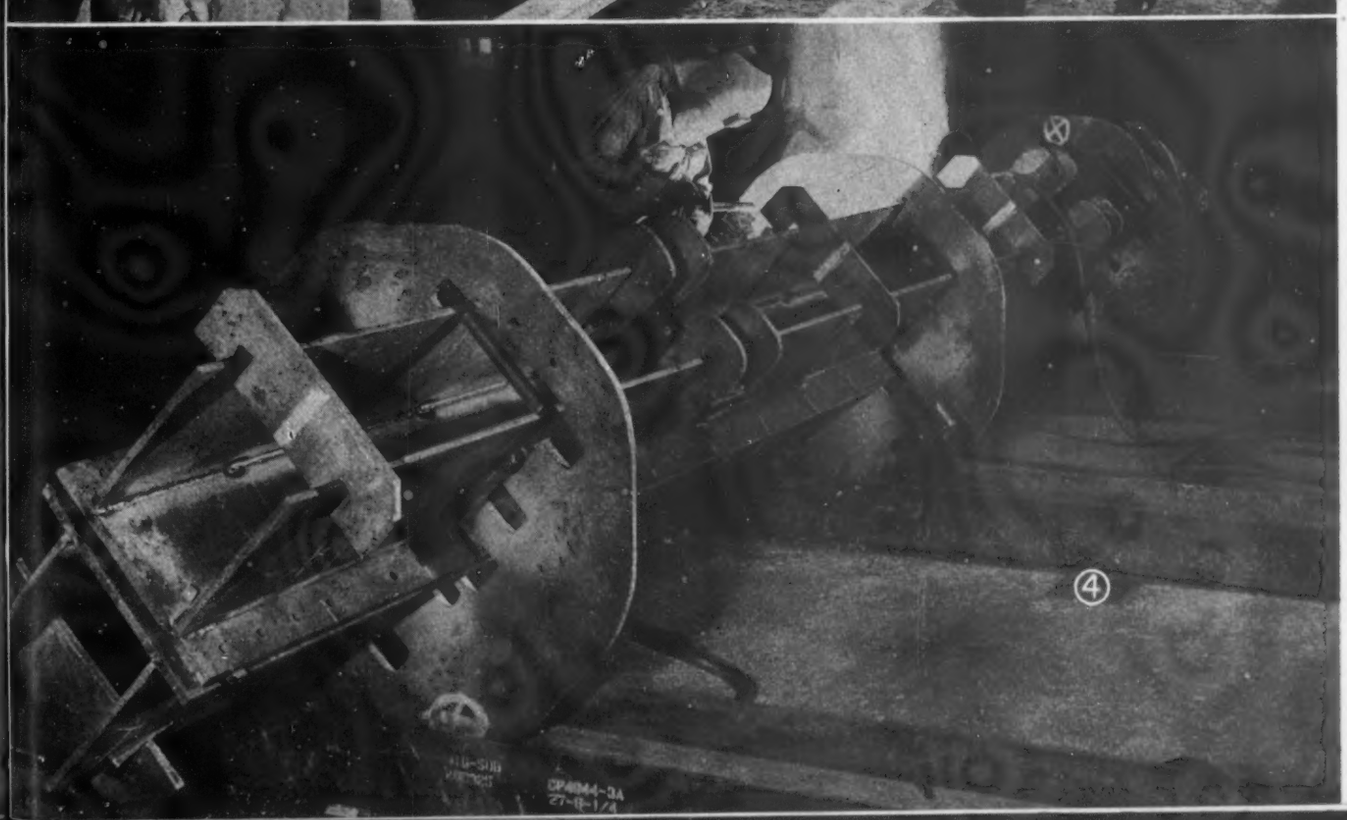


④

Summerill Tubing Co. improvises induction heating setup for . . . . . .

Heat Tre

By IRWIN H. SUCH
Engineering Editor, STEEL

CONSIDERABLE work has been done recently in applying continuous processes to heat treating and annealing of materials such as wire, bars and tubing. Several such installations now are in commercial operation using both gas and electrical induction heating and, in fact, it may be said that the process has emerged from the experimental stage and has "arrived" as a production method.

Under the direction of A. J. Williamson, chief metallurgist, the Summerill Tubing Co., Bridgeport, Pa., has worked out a method for applying continuous induction heating in annealing stainless steel tubing. The machine also may be used for heat treating other types of alloy steel, such as SAE-4130 and NE-8630. Significantly, these steels may be quenched in oil after emerging from the heating coil without danger of fire.

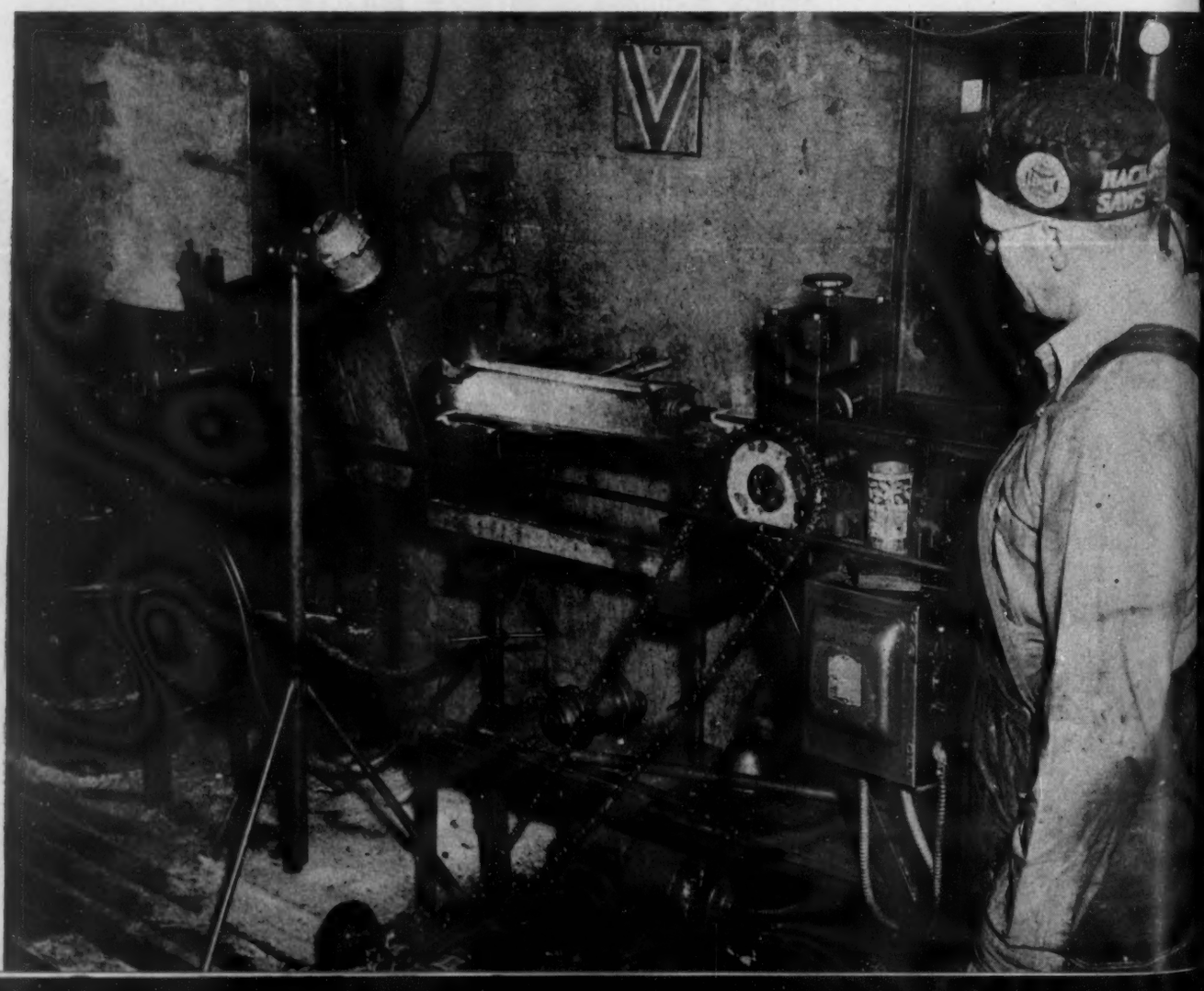
The heart of the machine is a standard 30 kilowatt Lepel high frequency spark-gap induction heating unit with a frequency range of 100,000 to 300,000 cycles per second. This spark-gap unit was originally designed for intermittent operation in heat-treating small parts one at a time. With the continuous operation required by Summerill's adaptation, it was necessary to introduce some modifications, largely in the way of additional cooling capacity to provide for the constant load on the transformers and condensers.

The cabinet housing the power units occupies comparatively little floor space, measuring 34 x 70 inches. The adjustable spark gaps are water-cooled as are the tank condenser terminals, the connecting cables leading to the heating coil and the heating coil itself. The unit operates on single phase 60 cycle current and the high frequency is controlled by means of a reactance type input control in 10 steps.

The functioning of the working parts as adapted by Summerill may be more readily perceived by referring to Figs. 1 and 2. Directly in front of the operator in Fig. 1 will be seen a pair of grooved feed rolls driven by a variable speed drive. Rate of feed averages 8 to 10 feet per minute, depending upon the size of the tubing being processed.

The rolls feed the tubing directly into the heating coil which varies in length from 6 to 10 inches in accordance with the size of tubing being treated. The coils are wound from 19 to 20 feet of

Fig. 1 (below)—This improvised induction heating machine is operated by the Summerill Tubing Co. for heat treating tubing ranging from 2 inches down to ⅜-inch in diameter. Drive rolls force the tubing through the heating coil and the quench. A conventional spark-gap high frequency unit may be seen in the background



Treating Tubing Continuously

¼-inch copper tubing and in each case enclose a length of fused silica quartz tubing which serves to guide the work and prevent short circuits.

An optical pyrometer is sighted on the work at the point where it leaves the heating coil and is just about to enter the quench, thus providing an accurate check on temperature. By making the necessary adjustments in feed and power input, the operator can obtain the temperature desired.

While some heat treating operations require quenching in air or water, it also is desired to quench in oil which immediately brings up the problem of fire hazard. This hazard, however, has been largely eliminated by a quench "tank" of novel design consisting of a tube about 15 inches long and just large enough to admit 2-inch tubing, the maximum size processed by Summerill. The oil is recirculated through the tube in the direction of line of travel of the tubing being quenched. By regulating the speed of the drive rolls and the flow of oil, little or no oil emerges from the opening.

The same equipment can be used for circulating a water quench or the material may be allowed to cool in air by simply turning off the quenching medium. Tubing in any length from 2-inch down to ⅜-inch outside diameter may be handled. Constant operation is maintained inasmuch as a tube which has passed the feed rolls is pushed through the coil and quench tank by the following tube.

Stainless steel tubing is annealed by heating to about 1900 to 2000 degrees Fahr. and quenching in water. SAE-4130 and its alternate, NE-8630, are heated to about 1600 degrees Fahr. and quenched in oil, resulting in maximum rockwell C hardness of 49-50.

The tubing then is put through a continuous type controlled atmosphere tempering furnace at 750 to 1100 degrees Fahr., depending upon the hardness desired. Final hardness specified may range from 25 to 40 rockwell C. The same two steels may be normalized by heating to 1600 degrees Fahr. and cooling in air.

Summerill finds that the principal advantage resulting from use of the induction method is the uniformity of temperature control which, of course, means the quenching temperature.

The method of progressively quenching the tubing minimizes and practically eliminates distortion which has always been a difficult problem in processing tubing. Grain size is extremely fine and there is practically no scale.

Members of the electric furnace and laboratory departments aided in ironing out many of the problems which arose in perfecting the operation of the unit. These included Morris March, Edward Eastburn and Lloyd Zeigler.

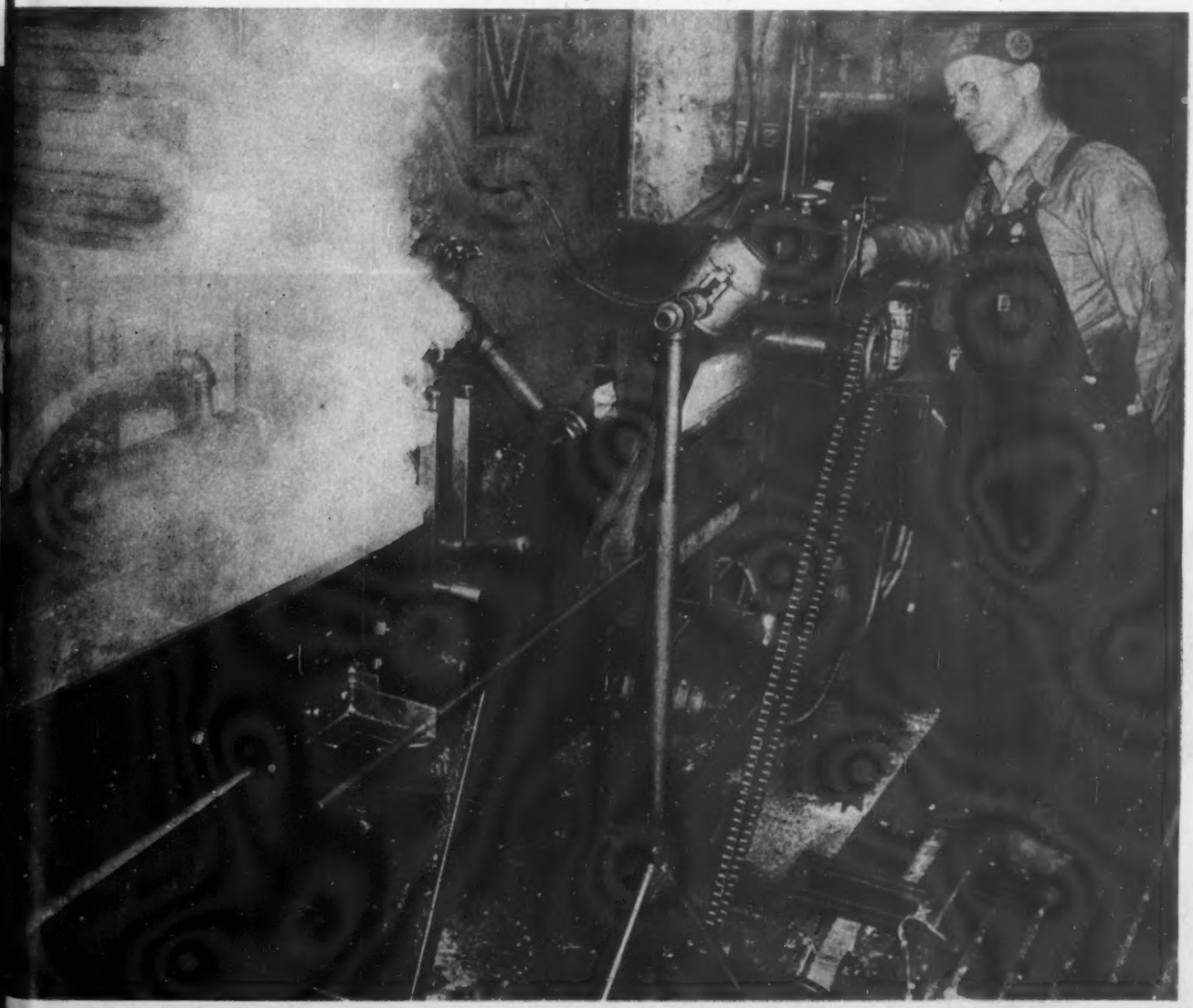


Fig. 2 (below)—The continuous heat treating unit for tubing is shown here from the quenching side. Quenching may be done in oil, water or air

Helix-Type

. . . for supercharged diesel engines are fabricated by electric welding

ONE OF the most familiar small town sights of other days, when automobile racing was a popular sport, was the bare chassis of some high-powered car roaring through the streets with a young and hopeful researcher and racing enthusiast at its wheel. The usual first treatment after the body was taken off was to remove the exhaust manifold and muffler and let the engine cylinders exhaust through individual exhaust pipes.

More recently, the diesel locomotives of the new streamliners are also equipped with individual cylinder exhaust pipes.

The purpose in either case is identical —to increase engine output. Engineers have known for some time that a 12-cylinder engine equipped with a common exhaust manifold does not produce 12 times the output of each individual cylinder because of interferences of exhaust of one cylinder with the proper functioning of adjoining cylinders.

When turbo-charging was introduced by Dr. Buechi this interference became of utmost importance, and he eventually developed "grouping of cylinders," two or three per manifold, in such a way that cylinders connected to one manifold would not overlap; i.e., when one was exhausting, the exhaust valves of others on the same manifold were seated. This led, for instance, to the complication of having four 2-cylinder manifolds on an 8-cylinder engine.

Welding permitted a real solution of this problem in the water-cooled Helixhaust manifold. Such a manifold in appearance does not differ materially from an ordinary open type water-cooled manifold, but its interior is subdivided into a required number of separate exhaust passages by helical baffles. Up to now, this manifold has been used in connection with turbo-charging by providing the Buechi grouping in connection with the manifold structure — which means, for instance, a four compartment manifold with two cylinders connected to each compartment for an eight-cylinder engine.

But where a higher degree of supercharging is desired, an eight-cylinder

(*Please turn to Page* 102)

Fig. 1 — Completed Helixhaust manifold for large 8-cylinder diesel

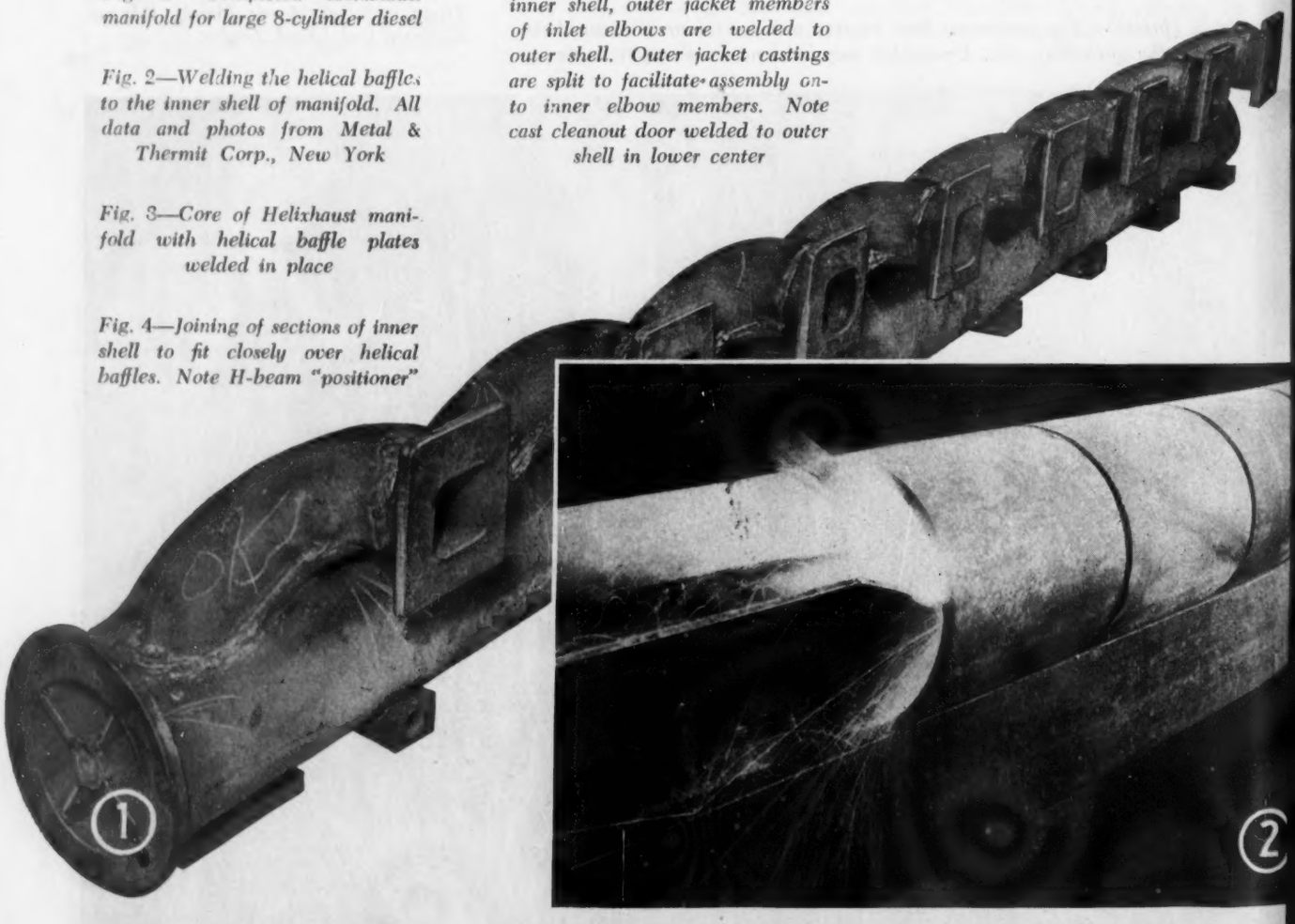
Fig. 2—Welding the helical baffles to the inner shell of manifold. All data and photos from Metal & Thermit Corp., New York

Fig. 3—Core of Helixhaust manifold with helical baffle plates welded in place

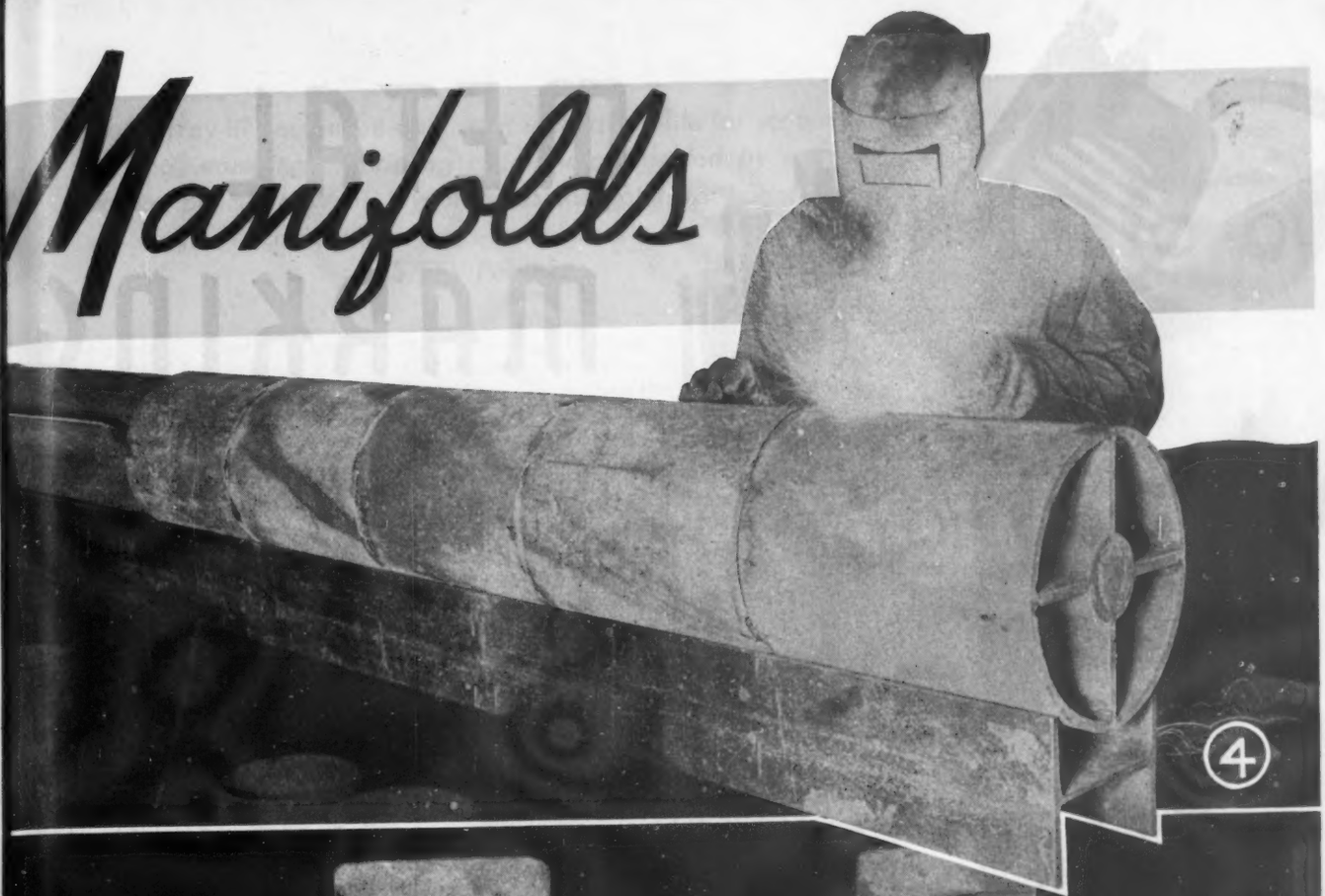
Fig. 4—Joining of sections of inner shell to fit closely over helical baffles. Note H-beam "positioner"

Fig. 5—After inner members of inlet elbows have been joined to inner shell, outer jacket members of inlet elbows are welded to outer shell. Outer jacket castings are split to facilitate assembly onto inner elbow members. Note cast cleanout door welded to outer shell in lower center

Fig. 6—Pipe assembly in fixture with inlet elbows in place and openings cut in inner and outer shells for outer elbow sections



Manifolds



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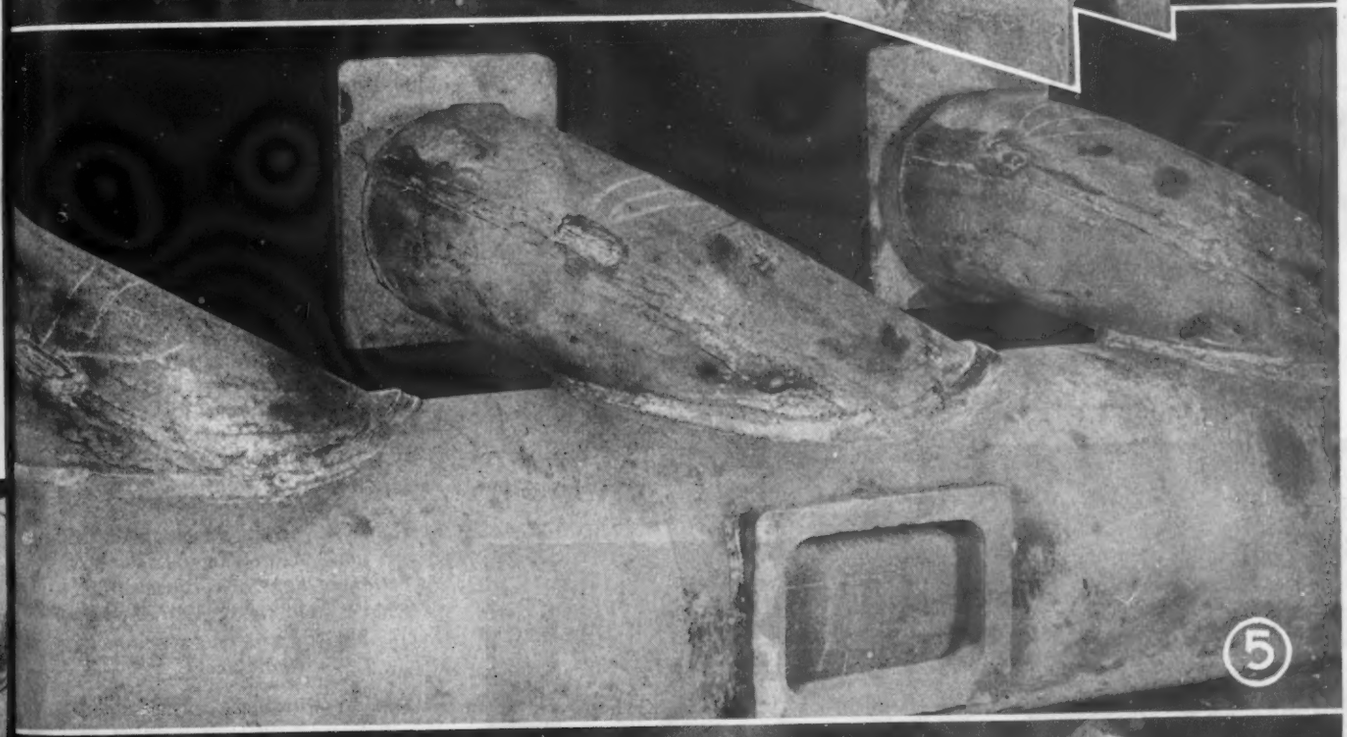

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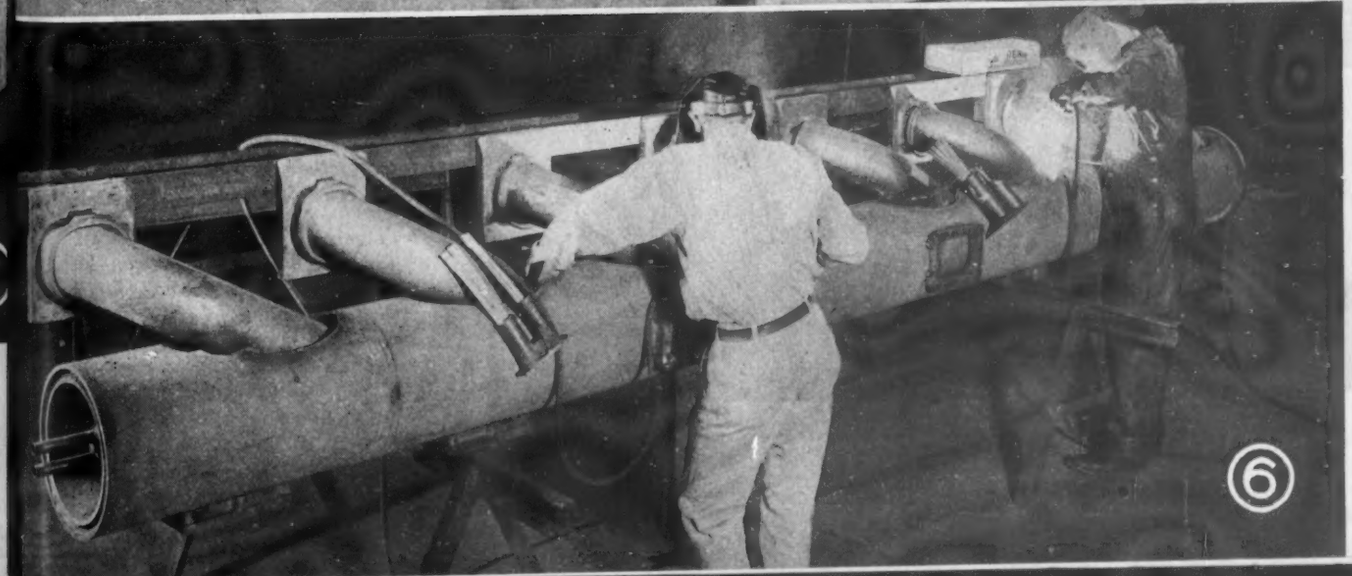

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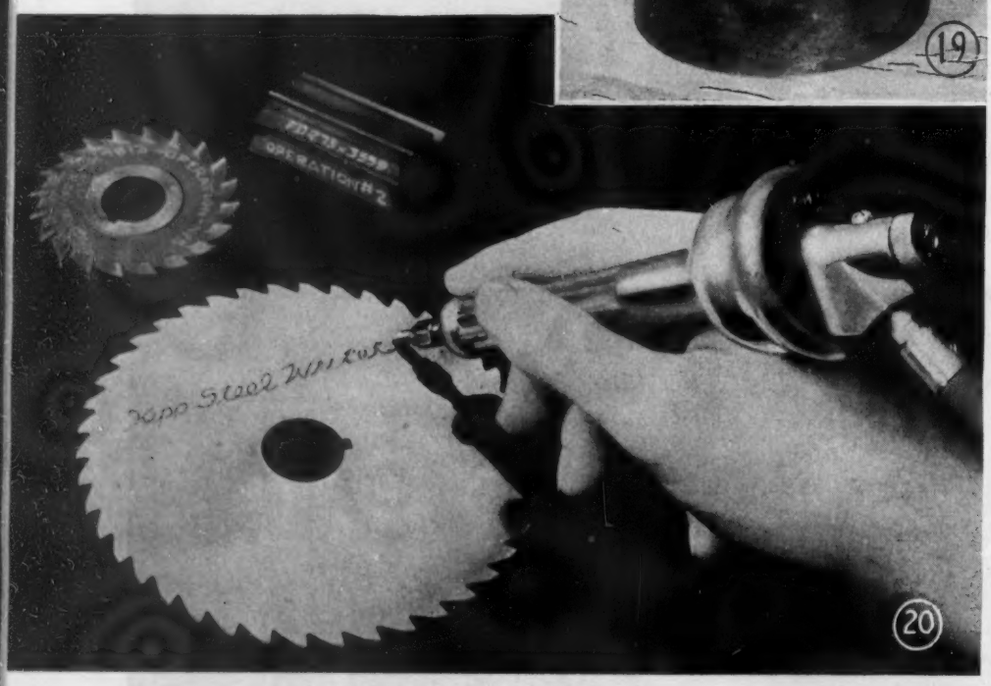
METAL MARKING

By JOHN E. HYLER
Peoria, Ill.



COLOR can be and often is used for identification of steel parts in process, in addition to the generally understood application of color to distinguish alloy steel bars and shapes of similar form but varying analysis. Hot metals in the form of semifinished material at the steel plant, or forgings and castings are sometimes marked with paint sticks while cooling from temperatures of between 300 and 1200 degrees Fahr.

Paint sticks available for hot marking naturally differ in composition from those intended to mark figures and symbols on cold work. In either case, however, they can be carried handily in the pocket. For marking hot metals, only white and yellow are believed to be available. This paint will not run when applied and there is none of the untidiness connected with certain other kinds of paint marking. Black, white, red, yellow and blue sticks can be obtained for cold marking, and one line of sticks will mark either a wet or dry surface as long as it is cold. Most markings of this kind are

Fig. 17—Vibratory tool operating by solenoid. Made by Burgess Battery Co., Chicago, this unit can be fitted for etching by electric arc for use on exceptionally hard steels

Fig. 18—Five-heat model etcher with special offset stylus that remains cool. Photo courtesy of R. B. Annis Co., Indianapolis, Ind.

Fig. 19—Machine tool etcher being used to mark part number on turret lathe jig. Photo courtesy Ideal Commutator Dresser Co., Sycamore, Ill.

Fig. 20—The tool shown can be used in the chuck of small, high-speed air grinders in place of the customary mounted wheel. Photo courtesy Madison-Kipp Corp., Madison, Wis.

Vast array of equipment and small tools available for scribing, etching, stamping or printing metals is augmented by metal-writing pencils, crayons, layout dopes and paints for hot or cold marking. Machinery for large-scale work was discussed in STEEL Feb. 5

weatherproof in either case and will remain legible indefinitely.[1]

Some users prefer crayons specially made for hot work. One crayon maker has developed a line to conform to the particular requirements of various temperature ranges. One crayon will mark any hot metal up to 800 degrees Fahr., yet its counterpart in this line will mark smoothly on metals at temperatures to 2000 degrees Fahr. This crayon does not smoke, burn, or run, and it dries white so as to be clearly legible.[2]

Pencils for marking polished metals, as well as glass and porcelain, come in purple, green, red, yellow, black, vermillion, blue and other colors. Their marks will not wash off, should the surface happen to be sprayed as in a cutting operation, and can be readily removed after identification is no longer needed.[3]

Talc or soapstone crayons are used in many places, and are especially convenient for cold marking on steel.[4] They are supplied by a number of firms. At least one company which saws crayons from pure hard talc will provide them either in square, round, or flat sections. The flat talc crayon is much favored by welderies for rough laying out or marking of joining cuts on various types of structural steel. It requires much less sharpening, and more of the talc contained in the crayon is thus available for marking. In some welderies, cardboard templates are developed that will fold or wrap around the piece of structural steel that is to be marked and then cut freehand with a torch.

The "wrap-around" template of cardboard has the cut developed on the end of it, if it is for standard work, in the engineering department. Template is wrapped around the steel, folded tightly against it at all points, and then a worker simply marks around the end of the template with the flat talc crayon. A master drawing of the template is kept in the engineering department so that it can be replaced readily when it has become worn to the extent of lost accuracy. This is only one of many uses of the talc crayon. It is used by railroads, rolling mills, and in various types of metalworking.

Layout for highly accurate work naturally requires an entirely different method. Special layout dopes frequently are applied to the surface of the metal to be laid out, by brushing or otherwise, with the idea of setting the surface color in contrast with color of the metal itself.[5] Then, by marking the metal with a scribing tool which makes a very fine line, the scribed lines show up in sharp relief. At the same time, dope eliminates the glare that in many cases comes from an untreated metal surface. Blue dopes are supplied by different makers for this purpose. Aluminum, copper, tin, and stainless steel all can be laid out to advantage with some of these dopes, most of which will not chip, crack, or flake off. Tools, dies, templates and patterns are all marked off in this manner.

There are some layout fluids specially suited to individual marking problems. One manufacturer provides pink dope for layout work on cast iron.[5]

Scribing Tools

Use of scribing tools commercially made for the purpose will convince anyone that they do a better job of marking than improvised tools, i. e., those made from ordinary wire, etc. Some layout men find it convenient to carry a scriber with them. This need has been met through development of a single-point scriber, with the scribing point held in a two-jawed chuck.[6] The point can be reversed when not in use so that the sharp point is housed within the body of the tool. It then can be safely carried in the pocket, being only about 4 inches in length when closed.

Single and double-point scribers, in which points are threaded to screw into holders, are suitable for keeping at the layout bench. Either straight or bent points are available.[6] Quite often a layout man will use a double-point scriber with a straight point at one end and a bent point at the other. The bent point is especially useful for reaching through holes. One scriber that is popular has an adjustable knurled sleeve which can be set for holding the marking tool firmly at a location close to the scribing point, or far removed from it, as conditions dictate.[7] A knife-type scriber can be used with this tool as an auxiliary. In most cases, the knife scriber is found among tools of the pattern-maker.

Electric Etchers

Permanent marking is also a function of electric etchers. These little etching tools have become so useful generally that their manufacture has been taken up by many firms. One is fitted with an Elkonite tip pencil.[8] Some of these smaller outfits are fully contained (etching tool, terminals, leads, workplate and transformer) in a neat, portable case. Tools of this kind will mark permanently iron, steel, or any of their alloys. (See Figs. 17, 18, 19, 20 and 21.)

An interesting problem was introduced and solved in marking steel products which also must be demagnetized. Some electric etching equipment, available in both alternating and direct-current models, will do this job.[9] One such unit is shown in Fig. 21.

The necessity for keeping the stylus relatively cool provided the incentive for one maker to design an electric etcher (Fig. 18) for marking hardened steel which is provided with a special offset stylus in which there is little heat build-up.

Odd and Special Marking Tools

Some tools for marking metallic materials are peculiar in that marking ability of the tool is due to mechanical motion of the marking element itself. One of these, presented in Fig. 17, uses the vibration principle. Motion is imparted by a solenoid, the tool operating from any 110-volt alternating-current outlet. The needle which does the etching is given 120 vertical strokes per second. When used for marking or engraving on hard steel, a tungsten needle is employed. A transformer also can be used

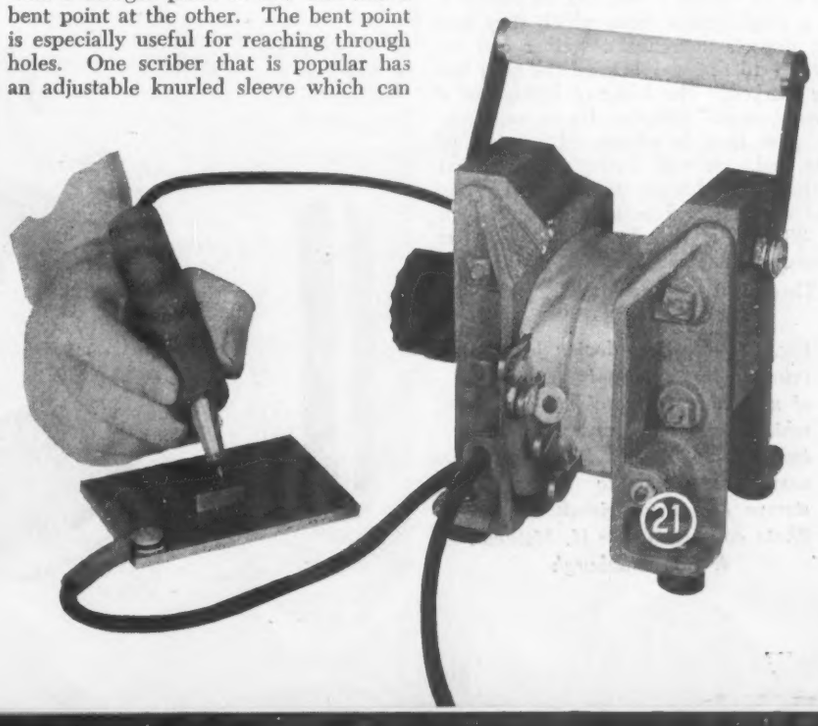


Fig. 21 — Combination electric etcher and demagnetizer shown in operation. Model is stripped of outer cabinet for demonstration purposes. Photo courtesy Printz Electric Co., Detroit

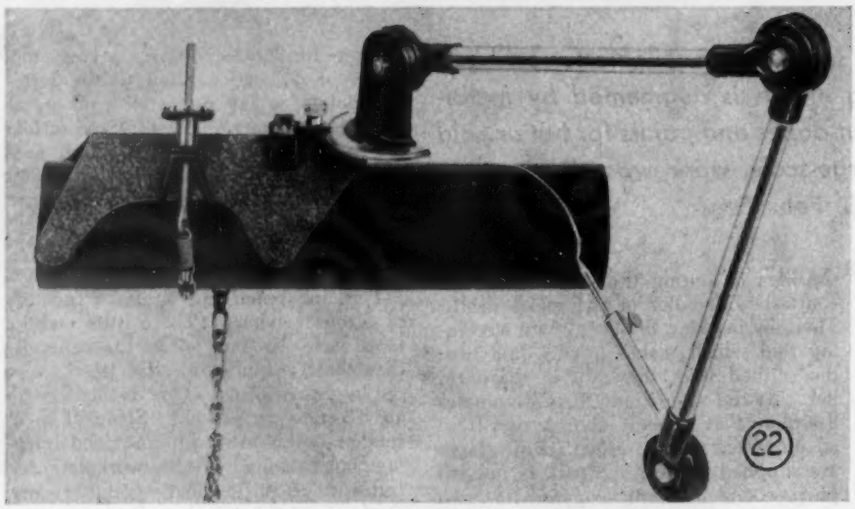


Fig. 22—Special protractor marker is used not only for laying out and marking angles on flat surfaces but for angle-scribing entirely around pipe and tubing as shown. Photo courtesy Tru-Line Corp., Los Angeles

in conjunction with it to bring the electric arc process into play for etching exceptionally hard surfaces. However, for most jobs, this is unnecessary.

Another tool, not so recently developed, bears the name Steel Writer (Fig. 20), due to the ease with which it will write on steel, glass, lead-coated stock, painted surfaces, etc. It is used in connection with a very small portable grinder that turns at 40,000 revolutions per minute. Revolved at this speed, the tool will cut steel and other materials as fast as the hand can go through the operation of writing. It has been found convenient in tool-cribs, tool and stockrooms where much of this work is done.

Some tools have been devised which are a combination of scribing device and protractor, making it possible to lay out marks on work with ease which otherwise would be very difficult. One such instance is that of a protractor fitted with an inverted V-type rest or clamp. When this rest is clamped to a piece of pipe, as demonstrated in Fig. 22, the neutral line of the protractor is parallel with the axis of the pipe. There is a triple-hinged scribing arm, with a scriber at the end. This scribing arm can be set at any angle, by the protractor. Hinges are all of special types, and all arranged in a single plane from which they can not depart, though the scriber can be carried all the way around the pipe being marked. The labor of laying out a "wrap-around" template for an angle cut on pipe thus is eliminated by use of this tool. It will scribe all structural shapes, in addition to standard pipe, and may be had in sizes from ½-inch to 36 inches, to take care of angular layout on flat surfaces.

There is an unusual device (Fig. 23)

Fig. 23—Knife-marking machine for marking freehand grinding profiles on steel knives in automatic, gang-cutterhead wood-shaping lathes. Photo courtesy Mattison Machine Works, Rockford, Ill.

for marking freehand grinding outlines on steel knives. It defines the cutting edge outlines on knives for automatic woodshaping lathes of gang cutterhead type. Nevertheless, it is a steel marking application. Knives are set on seats not parallel to the cutterhead shaft to endow them with a shearing cut. This condition, combined with the fact knives must be given an elongated molding profile to compensate for the fact they are not near radial position when at their deepest point of cut, tremendously complicates the layout of the profiles which must be ground on them.

Manufacturers of a line of lathes as described have created a very simple and efficient marking machine. A duplicate pattern board of the required turning profile is used in connection with the marker, to guide the course of an incorporated marking pointer. Turning profile itself often is quite complicated.

Before marking, knives are placed on heads or holders on which they are to run, and heads are mounted on a horizontal shaft in the marking machine. This has a diameter identical to that of the cutterhead shaft on the lathe where heads will run. Faces of knives are coated with whiting. As the marking pointer is moved along, following the pattern board, the cutterhead is gently and progressively turned on its shaft whatever amount is required to keep the surface of the knife in contact with marking pointer.

In a few cases, it is desirable to have a tool that will write directly on metals with a fine line. For this purpose diamonds frequently are used. They may be obtained from those firms who make a specialty of diamonds for industrial purposes.[10]

Steel Stamps and Dies

Employing steel stamps for marking steel might be considered too well known to require any comment, but they are too important as a class to be left out of a discussion of this nature. Stamps

(*Please turn to Page* 130)

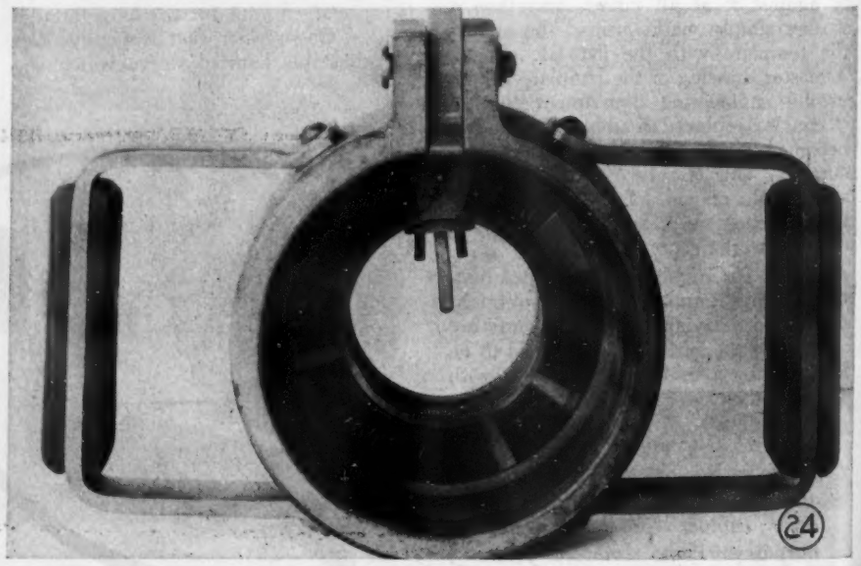


Fig. 24—Marking device for imprinting by impact is composed of a number of individual stamps which are struck separately with hammer to avoid distortion of workpiece inevitable where all stamps are struck simultaneously. Photo courtesy James H. Mathews & Co., Pittsburgh

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Helix-Type Manifolds

(*Concluded from Page 96*)

manifold is now being offered with eight separate exhaust passages in the manifold structure and leaving the Buechi system of grouping to be accomplished within the turbine structure. While this design gives a somewhat more expensive and somewhat larger diameter manifold, increased super-charging effect on the engine more than compensates for the slight increase in manifold cost.

At the Dayton Fabricated Steel Co., Dayton, O., who have manufactured a number of these manifolds for National Supply Co. diesel engines, an interesting welding procedure has been developed. The first step in this procedure is the welding of ¾-inch inlet and outlet pipes to a 2½-inch standard pipe which comprises the water-cooled core of the manifold. The four baffles which are made of ¼-inch plate and formed by means of special dies are then welded to this center unit, using continuous fillet welds on one side of each baffle and intermittent welds on the opposite side. These welds, made with 3/16-inch Murex Type FHP (Class E-6020) electrodes, must be gas-tight to prevent passage of exhaust gases from one chamber to another. Next, short lengths of 11-inch standard pipe, approximately 14 inches long, are slipped over the vane assembly, one at a time, and the baffles are welded to the inside of each of these lengths of pipe as they are placed in position.

When this operation is completed, and the baffle assembly is covered, the short lengths of pipe are welded together to form a gas-tight inner shell. Pre-preparation of the ends of the short pipe lengths provides V-type joints with 60 degrees included angle for these circumferential welds which are made with 3/16-inch Murex Vertex (Class E-6010) electrodes.

To check for leaks into the gas chambers and leaks in the circumferential welds of the inner shell, the unit at this stage is subjected to a hydrostatic test at 60 pounds pressure.

The next operation is to slip over the unit an outer shell of 14-inch standard pipe, flame-cut to accommodate the outer parts of the inlet castings and clean-out doors. This outer shell is then tack-welded in place, the pipe assembly is laid out and the openings for the inner members of the inlet castings are cut in the inner shell of the manifold.

After the inlet castings are welded to the inner shell by ½-inch fillets, the unit is again tested hydrostatically to insure against leaks in these joints. Final steps in fabrication are the welding to the outer shell of the castings forming the water jackets of the inlet members, the welding on of clean-out door castings and the welding of the inner shell to the outer shell by means of ½-inch fillets and V-type grooved joints.

The completed manifold is then given a final test of the water chamber, after which it is ready for machining.

All surfaces in the water chamber are either sandblasted or pickled before assembly and again pickled after assembly to prepare them for Heresite protective coating.

Any warpage encountered during welding is overcome by heating. Bases of all flanges and other surfaces which require machining are held to a tolerance of plus or minus ⅛-inch while the center distance limits are plus or minus 1/16-inch.

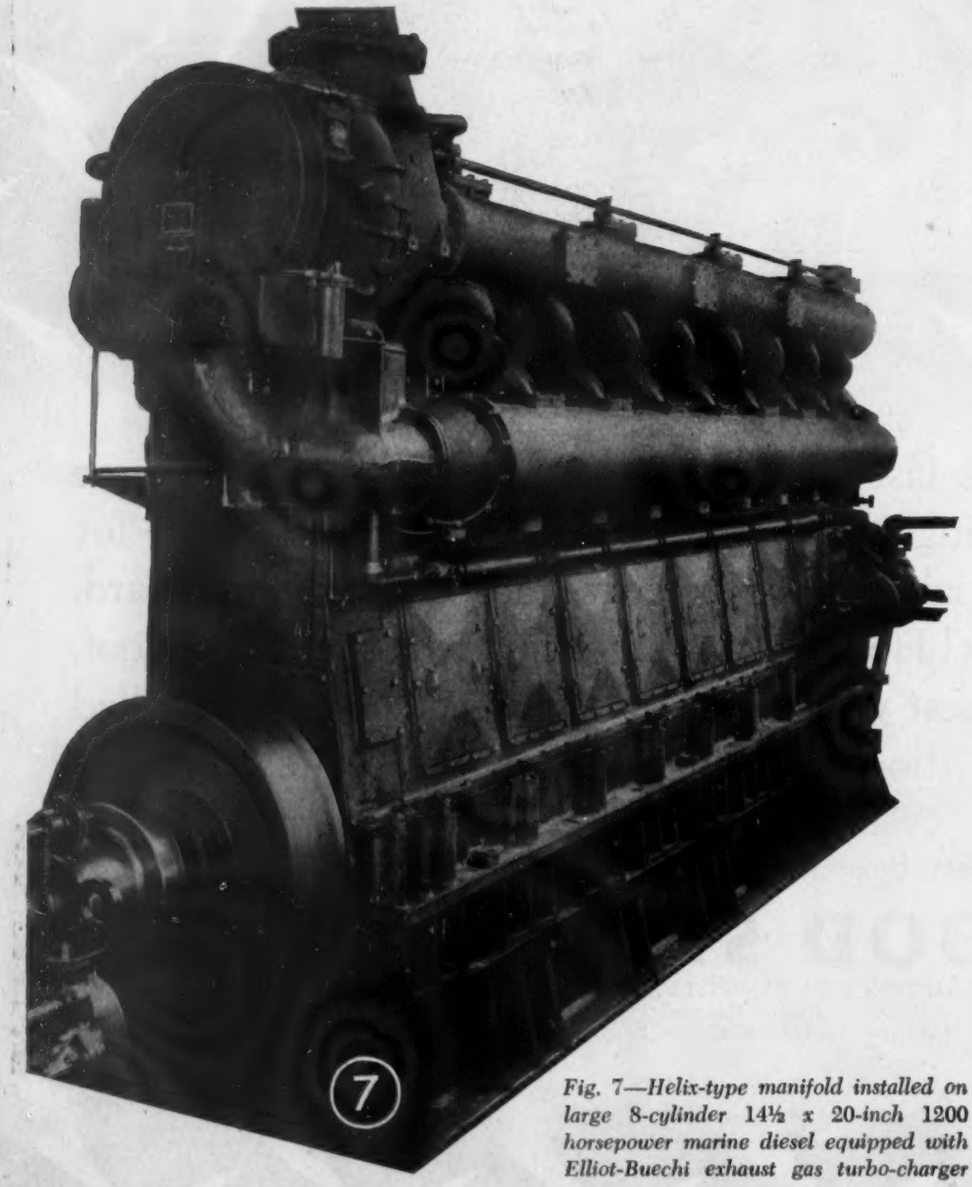

Fig. 7—Helix-type manifold installed on large 8-cylinder 14½ x 20-inch 1200 horsepower marine diesel equipped with Elliot-Buechi exhaust gas turbo-charger

New Relay Uses Single Electromagnet

Designed to respond to change in frequency, a new relay uses a single electromagnet and has two balanced circuits arranged so that a small change in power factor makes large changes in current. This results in high torque for the operating element.

When two parts of a power system, joined by a tie line are separated by loss of the connecting line, one section may not have sufficient generating capacity to carry its loads. Frequency will begin to fall off, perhaps so rapidly and to such an extent that the two systems may not be resynchronized until possibly a great deal of important load has been dumped. The function of the new relay is to decrease the amount of load dropped and to do it on a preselected basis instead of in the heat of an emergency.

Relays have been built for this purpose before but were more complex, entailing balancing of two opposing torques, i.e., two electromagnets, on a single disc. The new relay is superior in being independent of ambient temperature and in the degree of fineness of adjustment, according to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Another new frequency relay, CF-1, has a specialized application. Some war-born plants such as synthetic rubber factories have surplus electric-power producing capacity. Surplus power is fed into the local system. If frequency on the public utility system drops and the relatively small factory generating system tries to shoulder the whole load, the tie line is broken.

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Recent Developments in FORGING PRACTICE

By W. W. DYRKACZ
Works Laboratory
General Electric Co., Schenectady, N. Y.
and
L. B. FONDA
Thomson Laboratory
General Electric Co., Lynn, Mass.

Work done on forging presses and upsetting machines in General Electric plants is covered in third and concluding article of series. Heat treatment and testing methods also are described. Articles in preceding issues presented data on applications for forgings, die design, materials and other types of equipment such as steam, air and board-drop hammers

AMONG the more modern types of forging equipment is the upsetting machine. This differs from all the various types of hammers, both in construction and operation. As contrasted to the vertical plane of the hammer, all motion in the forging machine takes place in a horizontal plane.

The work is held by stationary grips and the free end is upset by a ram or header. By the use of several grips and several corresponding positions in the header, successive operations can be performed without removing the work from the machine.

The forging machine is essentially a horizontal press, its power being supplied by a large geared flywheel, motor driven. The forging is produced not through hammering, but by a squeezing motion. The initial motion of the header or upsetting ram toward the work is rapid and it strikes with a force approximating a hammer blow. The blow, however, is of a sustained nature because the hot metal is in the plastic state and continues to deform under the momentum of the heavy flywheel.

Forging and Upsetting Machines

The Lynn River Works operates one upsetting machine (Fig. 28) classified as 1½ inch. Its products include bushings, upset shafts, rivets, collars and general upsetting of stock up to 3 inches in diameter of upset section.

There are nine forging machines in operation in the Schenectady Works, rated as follows: ¾, 1, 1½, 2, 2½ and 3 inches. Typical upset forgings manufactured on these machines are:

Name of Part	Material Used
Reel hubs	SAE-1020
Coupling bolts	SAE-1045
Studs, commutator studs	NES-9440, SAE-4140
Bevel gears	SAE-4140
Special hexagonal head bolts	SAE-4140
Hexagonal head bolts (general use)	SAE-1040
Jack bolts	SAE-2340
Tie rods	Stainless type 309
Lifting rod	Stainless type 310
Turbine bucket blades	Stainless type 403
Copper studs	Tough Pitch Copper
Shafts	SAE-4140

The Lynn River Works has in operation a so-called "bulldozer." It operates on the same flywheel principle of horizontal motion as the upsetting machine, but is of lighter construction. It is used for bending, shearing, and punching. Motor brackets made on this machine may be bent and punched in the same operation.

Presses

Modern press forging is essentially an outgrowth of earlier work done in developing equipment which was suitable for the various operations performed cold on sheet or plate stock. It began to enter the forging picture when the need was felt for mass production methods of making precision forgings, especially in the alloy steel field; thus, it developed with the automobile industry as a means of forging the constantly mounting varieties of alloy steel into parts of low weight and minimum finish. The pressure finishing reduced subsequent machining and scrap loss.

The machine developed to furnish the utmost in accuracy was the modern hot coining press. One of the principal requirements in press construction is rigidity. The great pressures built up in the downward stroke of the final operation will stretch a weak bed frame and cause imperfect die alignment. As the path of minimum resistance for metal being forged is through gap between dies rather than into deep recesses of the die itself, excessive flash is formed at the expense of intended protrusions of forging, especially in forgings of complicated shapes.

To withstand these tremendous loads the coining press is of heavy construction, with a heat-treated, one piece steel frame, strengthened with four large shrunk-in tie bars. Its "stallable" feature consists of a full eccentric type main shaft, and

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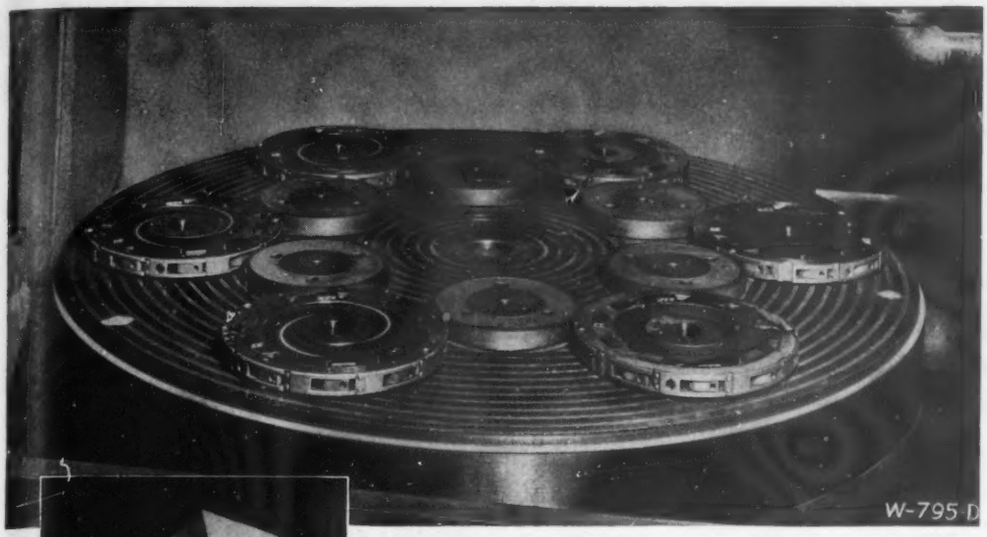
Fig. 28 — One and a half-inch forging machine with set-up for making ⅝-inch motor rivets



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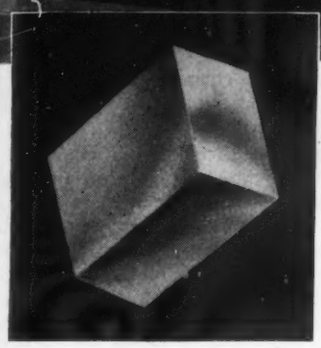
★Close Limits
★Flatness



Actual Size of Blade

★*Fine Finish* ★*Close Limits* ★*Flatness*

Grinding Hardened Steel Refrigerator Blades

These refrigerator blades are ground square to .0001″ on each end.

For the first operation the blades, held in special fixtures, rest on supporting plates. After grinding one end, the fixtures are turned over with the ground end of the blades resting directly on the magnetic chuck, thus insuring greater accuracy The photograph shows them ready for this second operation.

Sixty blades are on the chuck at one time, .006″ of stock is removed from each end and production is at the rate of 200 pieces (400 surfaces) per hour.

The *"Put it on the Blanchard"*

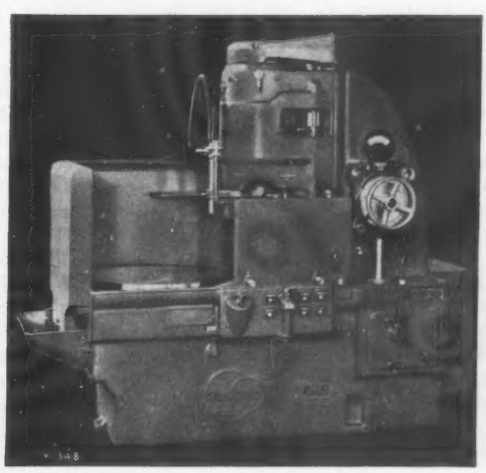
BLANCHARD MACHINE COMPANY

64 State St., Cambridge 39, Mass.

This job being done on the
No. 18 Blanchard Surface Grinder

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD



PREVENTION of SLUDGE DEPOSITS

By DR. R. W. MITCHELL
Technical Director
Magnus Chemical Co.
Garwood, N. J.

in fuel oil storage tanks through the use of dispersing agents permits more efficient furnace operation

THE place of fuel oil in the production of both iron and steel and in the metal products and machines made from these metals is so important that the troubles caused by sludge deposits in the oils used for firing furnaces, ovens, heaters, boilers and other equipment deserve much more attention than they are usually given.

Bunker C and heavy fuel oils, regardless of grade and quality, tend to build up sludge deposits in the storage tanks, which not only give rise to difficulties at those points, but tend to cause material troubles in the firing systems of individual furnaces and other equipment, once they have been allowed to accumulate to any extent. Adequate temperature control, thermal efficiency and smooth production are considerably affected and where atmosphere control is important, the time is sure to come when the suction of the feed pump pulls sludge into the supply line. Clogged screens and burner orifices are immediate results, frequently necessitating shutdowns for cleaning which have to be repeated as long as the sludge is allowed to remain in the storage tank.

Bothersome as this cleaning process may be, the effects of sludge on combustion, burner efficiency and effective temperature control are far more costly. In addition, carbonized sludge in the burner often makes necessary complete dismantling of the burner system and replacement of nozzles.

Where sludge accumulations exist in the storage tank, their removal is far from an easy job. Ordinarily, the only practical procedure is to pump off the unsludged oil and then to muck out the sludge by hand. This is a time-consuming, unpleasant job which is undertaken, as a rule, only when deposits are very heavy and shutdowns for cleaning screens and lines occur very frequently—often many times a day.

It should not be assumed, however, that sludge troubles are not present unless the deposit in the storage tank is heavy. It does not take a great deal of sludge to affect materially the efficiency of burners.

These sludge troubles can be controlled and in almost all cases eliminated by the use of certain agents made up of organic materials which act as oil soluble dispersing mediums on the sludge and water which are the bases of these difficulties. This type of agent disperses the sludge throughout the entire body of the oil, where it becomes a part of the main oil body and is burned with the oil as it is used.

Fundamentally, the action of this agent is based on the dispersal of water agglomerations into very fine particles. It has been determined that sludge accumulations are based to a material extent on the action of relatively large water particles in attracting and holding dirt of various kinds to form the familiar sludge deposits.

The oil, with the dispersed sludge, has a lower surface tension than the unsludged oil, giving better atomization. Its viscosity is lowered as well, giving easier flow. The oil and dispersed sludge, because of better atomization, give more complete and regular combustion. Thermal efficiency is improved and smoking reduced or eliminated.

Effects of Dispersing Agents

When the proper types of sludge dispersing agents are used, no effects of any kind are noted on the products being fired. These agents burn completely with the oil, and have the same products of combustion as oil—carbon dioxide, nitrogen and water vapor. They have no harmful effects on the metals and parts of the system and do not affect the flash point of the oil.

Very small amounts are capable of doing the work of rendering a Bunker C or heavy oil sludge-free, and of preventing the formation of sludge deposits. Relatively small quantities will clear up accumulations of sludge in storage tanks.

Used to inhibit sludge formation in storage tanks and supply lines, one pint is added to the oil in the storage tank for each 1000 gallons of oil. This concentration is maintained at all times by adding the required amount of dispersing agent whenever more fuel oil is pumped into the tank.

Where a storage tank feeds another tank, or series of tanks, it is advisable to treat the main tank to insure sludge-free operation throughout the entire system. Where there is any appreciable amount of sludge present in the system before treatment of oil is begun, it is advisable to use the dispersing agent to dissipate the deposit before starting routine treatment of added oil, in order to be sure that the effects of the low concentration of dispersant for inhibiting purposes does not loosen sludge in lumps and slugs, thus causing acute sludge troubles.

By starting with a tank in which the sludge has been completely dispersed as outlined, the routine treatment of fresh oil will end any dangers of sludge troubles.

The dispersing agent can be readily used to clear up sludge accumulations. One pint is added to each 400 gallons of combined oil and sludge in the tank. It is preferable to mix the agent with a few gallons of light oil before adding to the tank in order to speed up its mixing with the oil in the tank.

Mixing is not absolutely essential since the agent will, in time, disperse itself throughout the oil and sludge mixture. However, the action can be greatly hastened if the tank is agitated with air or by pumping immediately after the addition of the agent. It takes considerable time to disperse unagitated heavy sludge deposits. The ultimate effect is dispersal of the sludge in the oil to form a homogeneous mixture which burns freely and completely and, as has been noted above, actually has less viscosity and lower surface tension than the unsludged oil. With extremely heavy sludge deposits the treatment may have to be repeated.

In iron and steel plants, and in the countless manufacturing plants where heat-treating, forging, die-casting, and other oil-fired production operations are carried on (not to overlook the power plant as well), the advantages of this method of sludge control are many. Lower surface tension and lower viscosity of the oil mean easier pumping, bet-

(*Please turn to Page* 152)

WOOD'S Moly SHOVELS receive their

Moly REG. US PAT OFF

...where magic MO-LYB-DEN-UM is mined

WOOD'S Moly Shovels, Spades and Scoops have really magical qualities of toughness, hardness, and wear-resistance. These exceptional qualities are derived from the special Mo-lyb-den-um alloy steel, (made to Wood's own special analysis) used in the blades of these truly super tools.

WOOD'S development of Mo-lyb-den-um alloy steel for shovels has been so outstanding as to earn the exclusive right for world-wide use of the name Moly.

Buy these better tools for toughest jobs where ordinary shovels don't stand up. Moly Shovels are unconditionally guaranteed to out-wear, out-last any shovels made.

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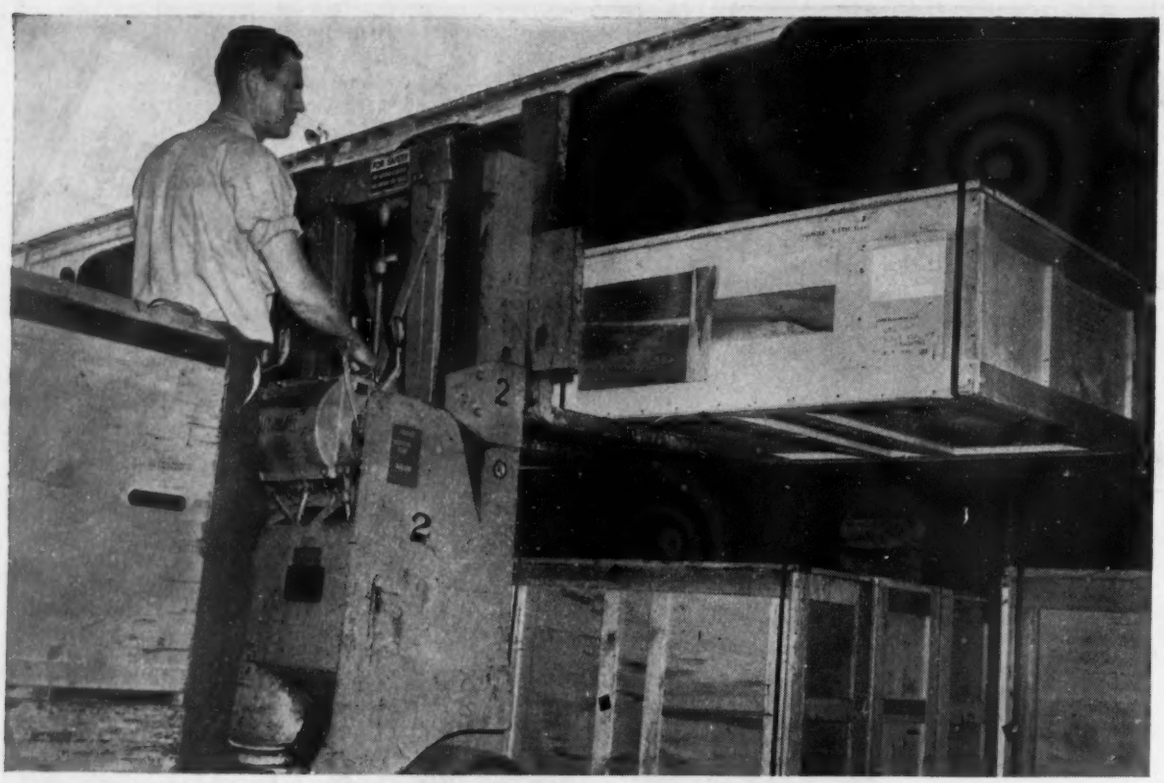
MO-LYB-DEN-UM ALLOY SHOVELS



PROTECTING PRODUCTION PROMISES

Loading and unloading cars, keeping machines and assembly lines adequately supplied 24 hours a day are jobs in which the battery industrial truck excels because of its inherent dependability and high availability.

With batteries exchanged two or three times a day, the truck is kept continuously supplied with power. While one battery is being charged, another operates the truck. Except for the few minutes needed to change batteries, the truck need not stop for servicing the power unit. Its electric-motor drives have a minimum of wearing parts and are inherently simple and trouble-free. The truck starts instantly; accelerates smoothly; operates quietly; gives off no fumes; consumes no power during stops. Thus it is well adapted to the stop-and-go characteristics of material-handling work. Not only does it make efficient use of power but the current used for battery charging is the lowest-cost power available.

Altogether the battery industrial truck is one of the most dependable and most economical methods of handling materials — especially when powered by Edison Alkaline Batteries. With steel cell construction, a solution that is a natural preservative of steel, and a foolproof principle of operation, they are the most durable, longest lived, and most trouble-free of all types of batteries. *Edison Storage Battery Division of Thomas A. Edison, Inc., West Orange, N. J.*

In Industrial Trucks, Alkaline Batteries Give You These Important Advantages

- They are **durable mechanically;** grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- They can be **charged rapidly;** gassing. cannot dislodge the active materials.
- They **withstand temperature extremes;** are free from freezing hazard; are easily ventilated for rapid cooling.
- They are **foolproof electrically;** are not injured by short circuiting, reverse charging or similar accidents.
- They can **stand idle indefinitely** without injury. Merely discharge, short-circuit, and store in a clean, dry place.
- They are **simple and easy to maintain.**

Edison
ALKALINE BATTERIES

Skid-Lift-Truck Handling

Facilitates Operations at Thew Shovel

Fig. 1—Skids in the stores department permit assembling materials so they can be picked up quickly

By GEORGE E. STRINGFELLOW
Division Manager
Storage Battery Division
Thomas A. Edison Inc.
West Orange, N. J.

BY ADOPTION of the skid-lift-truck method of handling materials, the Thew Shovel Co., Lorain, O., has solved two major problems introduced by the demand for increased production of power shovels and cranes resulting directly and indirectly from the war.

One of these problems consisted of the delivery, from the rough stores to the first operation, of the numerous small castings, forgings and other materials required to begin manufacture of incoming orders. In this class of stores are included gear blanks, bar stock for spindles and shafts, sheave castings, and, in general, units of material weighing approximately 3000 pounds and less.

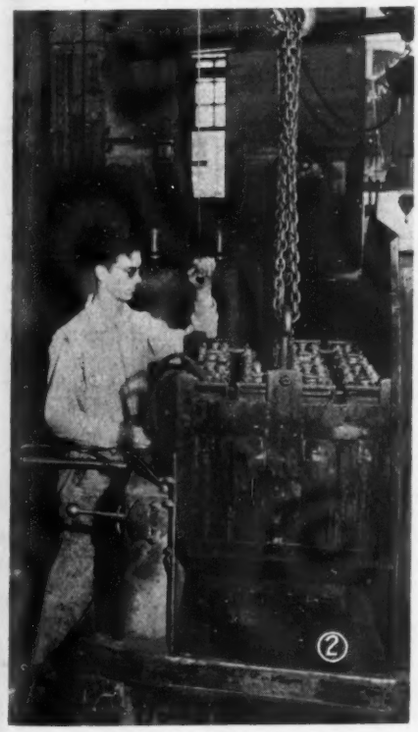


Fig. 2—Traveling crane or jib crane facilitate servicing of batteries and changing them every 8 to 12 hours

Because of the wide range in the number and specifications of these materials required by individual orders, they cannot be selected from storage until after the orders have been received, and, on an average, several hours are required.

In the former years, when the plant was not as busy as it is now, and the machines were not as numerous and as closely spaced, there was usually enough space in the production areas to accommodate these rough stores and permit bringing them in and assembling them there before work on preceding orders had been completed.

The stores were brought in partly by hand trucks but mainly by the use of transfer cars and overhead traveling cranes, the smaller parts being assembled in skid tote boxes provided with lifting ears.

With the installation of additional machinery, space in the production areas gradually decreased until it was at a premium except for work actually in process. It then became necessary to bring the rough stores for one order

Fig. 3—Brake bands are now handled in larger units and make very stable loads on skids

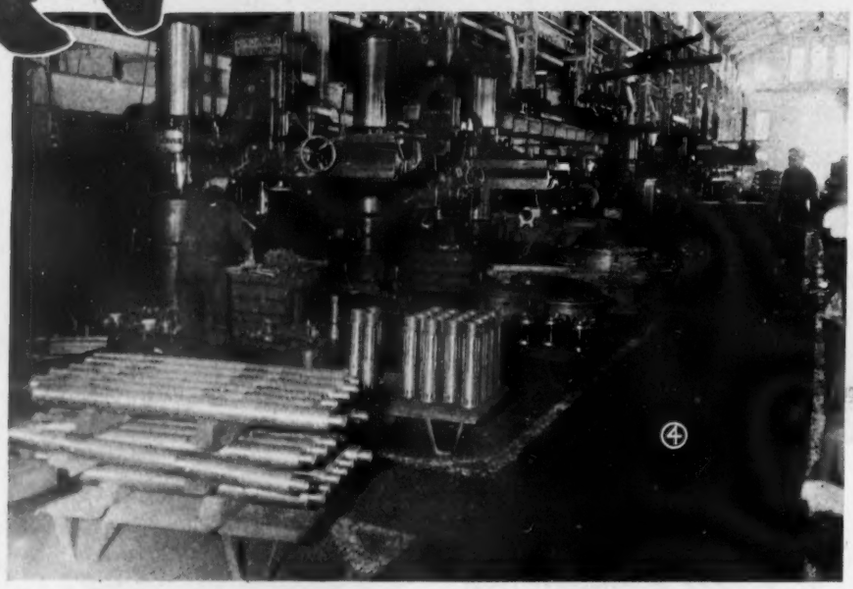


Fig. 4—Greatest reduction of handling motions had been made with such parts as sheaves, shafts, gears, and the like—parts which individually are just beyond the range of safe manual handling yet easily handled in multiple units on skids as shown here

only after the first operations on the previous order had been completed and the work had been cleared to the next operation. This it was impossible to do rapidly enough to avoid idle time. At the same time, these movements tied up cranes and transfer cars which were needed for the handling of heavier parts.

The skid-lift-truck system appeared to the plant management to offer a solution to the problem principally because skids would provide a means of assembling materials in the stores department so that they could be quickly picked up and carried directly to the first operation by platform-lift truck. This expectation has since been amply confirmed by experience.

Storage areas were paved and connected with the paved plant roadways so as to permit direct trucking movements. Skid platforms, 28 x 42 inches were provided to utilize loads of intermediate-size parts which formerly were largely handled one at a time.

Present procedure is to maintain in

(*Please turn to Page* 164)

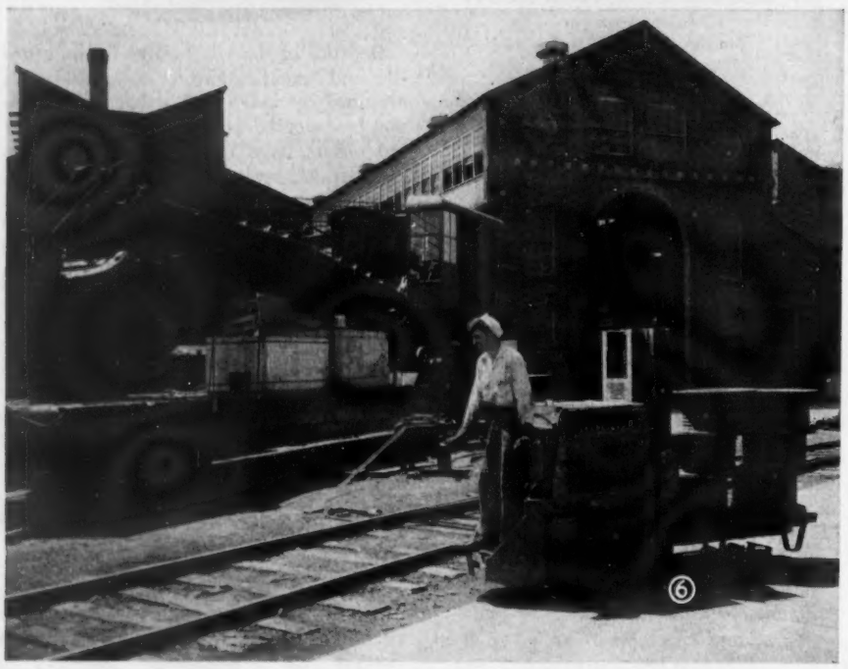
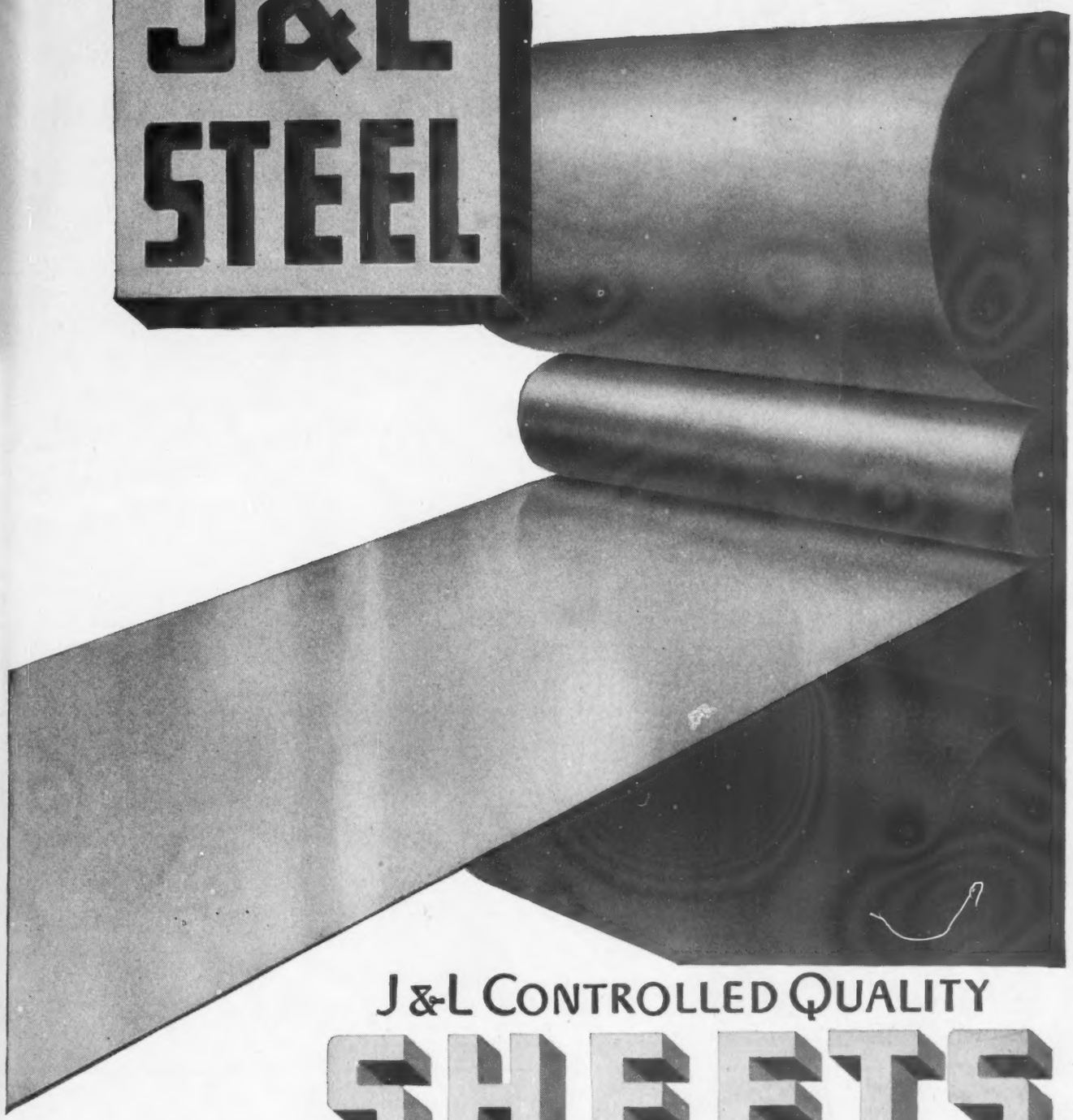


Fig. 5—Loading work on skids facilitates movement directly to next machine operation, saving up to eight piece-by-piece handlings

Fig. 6—Increase in stock of finished parts required use of storage areas beyond crane reach. Such areas were made useful by adoption of the skid-lift-truck system

J&L STEEL



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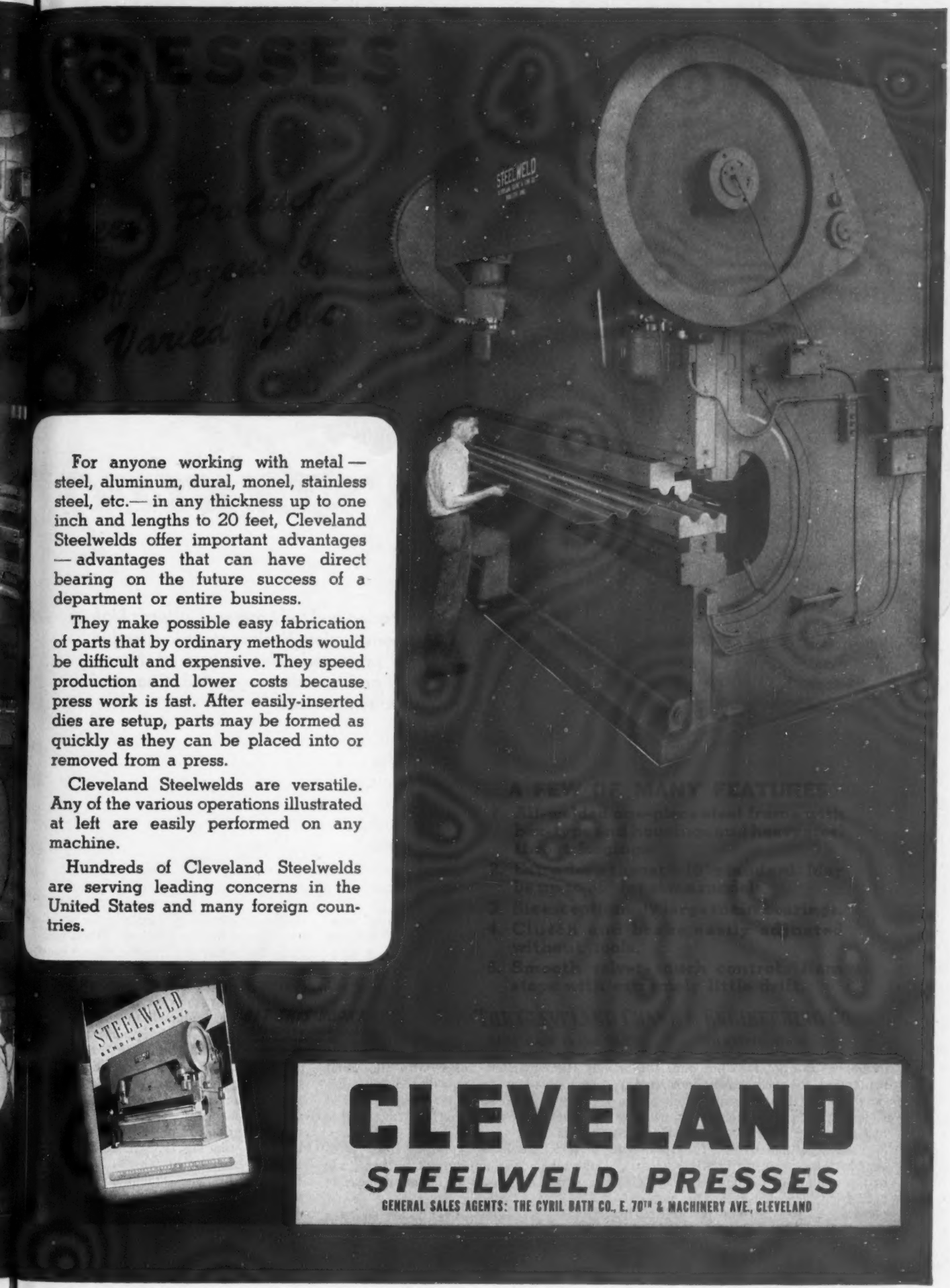

For anyone working with metal — steel, aluminum, dural, monel, stainless steel, etc.— in any thickness up to one inch and lengths to 20 feet, Cleveland Steelwelds offer important advantages — advantages that can have direct bearing on the future success of a department or entire business.

They make possible easy fabrication of parts that by ordinary methods would be difficult and expensive. They speed production and lower costs because press work is fast. After easily-inserted dies are setup, parts may be formed as quickly as they can be placed into or removed from a press.

Cleveland Steelwelds are versatile. Any of the various operations illustrated at left are easily performed on any machine.

Hundreds of Cleveland Steelwelds are serving leading concerns in the United States and many foreign countries.

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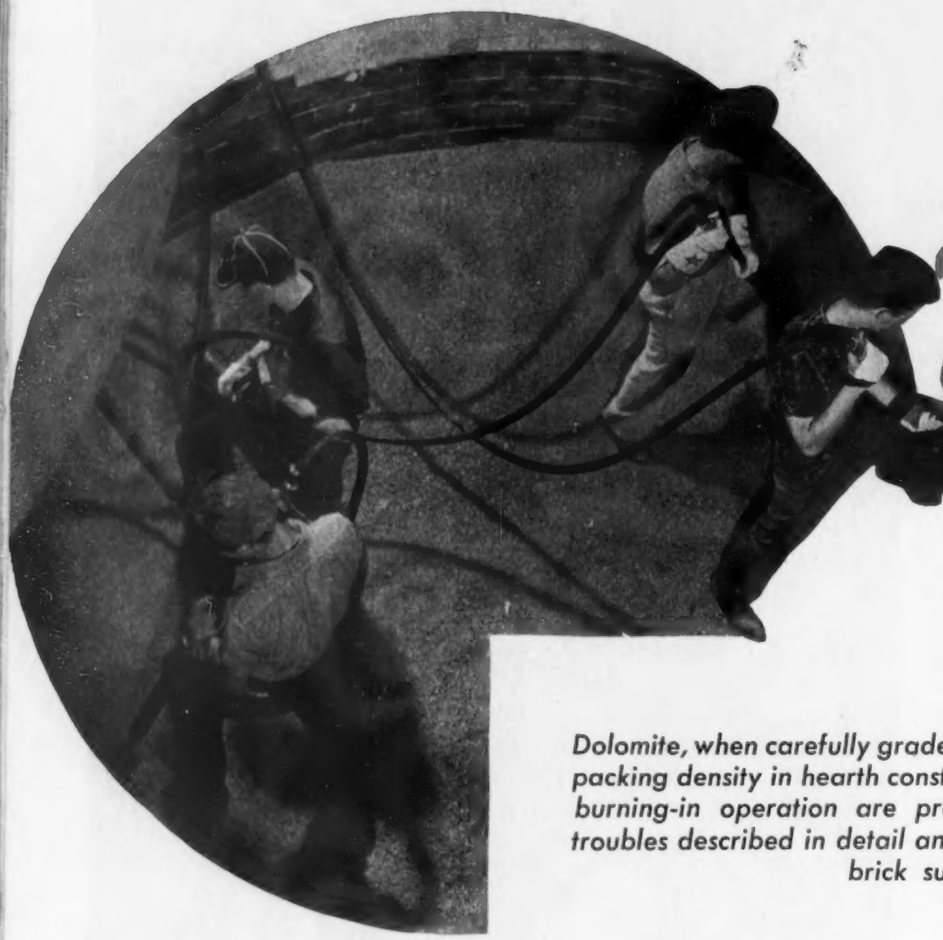
Construction and Maintenance of Arc Furnace Lining



Workers ramming in the bottom of a 35-ton electric furnace used for alloy steel production. Courtesy Allegheny Ludlum Steel Corp.

Dolomite, when carefully graded and fully rammed, affords high packing density in hearth construction. Various steps involved in burning-in operation are presented. Five causes of hearth troubles described in detail and remedies suggested. Choice of brick summarized

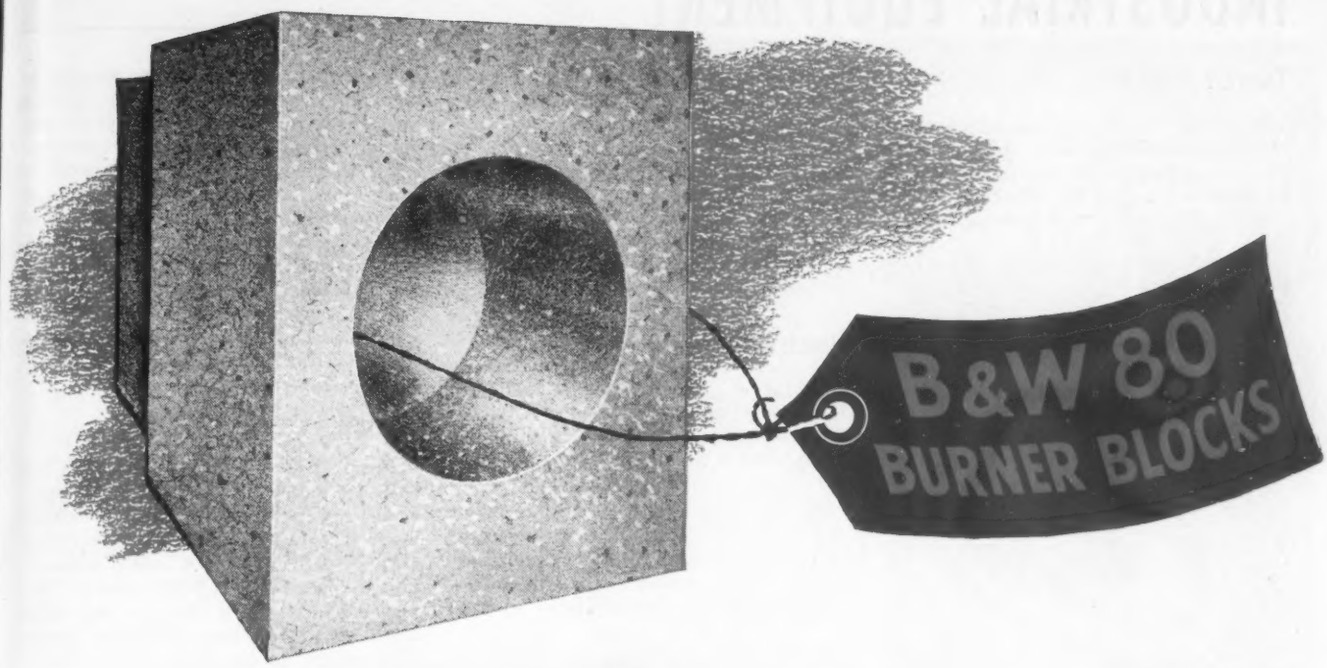
By N. F. DUFTY*
Metallurgist
Brymbo Steel Co. Inc.
Brymbo, N. Wales

OWING to the absence of domestic magnesite deposits in this country, magnesite hearths have never been widely used as they are on the Continent and in the United States. A well-burnt magnesite hearth is perhaps superior to any other but for all-round efficiency, dolomite is hard to beat. Unless magnesite is burnt-in, a well fitted crust is formed at the hot face but once this is penetrated, the metal easily finds its way through the friable material beneath. Dolomite, though less refractory, naturally frits to a greater depth and is therefore safer, particularly in a fully rammed hearth. Attention has recently been paid to the grading of dolomite so as to give a high-packing density. This not only gives added resistance to penetration by slag and metal but the bottom will last longer if erosion takes place at a given number of pounds per hour as there will be a greater weight of dolomite in the same space. The common "basic" supplied for fettling is too coarse but the tendency is now to use gradings containing an excessive amount of fine material. No allowance is made for the increase in fines caused by the use of mechanical rammers. A grading slightly coarser than that giving maximum packing density on the A. F. A. rammer test is recommended mixed with the usual amount of warm dehydrated tar. Six per cent of tar and a temperature of 158 degrees Fahr. serves well for most steelworks tars.

Reactions between certain fractions of the tar and dolomite merit further study and probably have an important bearing on the properties, particularly the stability, of tar-dolomite mixtures. When ramming the bottom, hot hand rammers must be used for the first 2 inches or the bricks may be damaged. After that, the pneumatic rammers are used when the mix has been tamped into position with hand rammers. It is important not to use the pneumatic rammers for too long or segregation occurs and the grading spoiled by the production of an excessive amount of fine material by abrasion. Almost any type of mill may be used for grinding the dolomite provided that the grinding time needed to produce the required grading is ascertained beforehand. The dolomite is usually warmed to about 158 degrees Fahr. to avoid chilling off the tar. When the bottom has been rammed to the correct thickness, a form is put in, centered and the banks rammed in a similar manner.

(*Please turn to Page* 154)

*From a paper presented before the West of Scotland Iron and Steel Institute, 93 Hope street, Glasgow C2, Scotland. The author since July has been Acting Pilot Officer with the Royal Air Force. The first installment appeared in last week's issue of STEEL.



IN SERVICE OVER A YEAR

...where fireclay-brick shapes failed in 6 to 8 weeks

Reduced cost of burner block replacement as well as longer life of furnace side walls and roof, were the advantages realized in an oil-fired bomb-nosing furnace when B&W 80 Burner Blocks were installed.

Standard quality firebrick blocks and also cast refractory blocks, previously used, had failed in six to eight weeks. After more than a year's service, B&W 80 Blocks are still in good condition.

Burner block maintenance is of course materially reduced, but more important results are the improved firing conditions and flame control. Impingement of the flame on the roof and side walls—which might cause their early failure and replacement—is thus eliminated. Additional benefits include reduced fuel consumption, more continuous operation, and a more uniformly heated product.

These savings are typical of the results secured by B&W 80 special shapes and standard brick. Ask your local B&W representative to show you how you too might be making similar savings.

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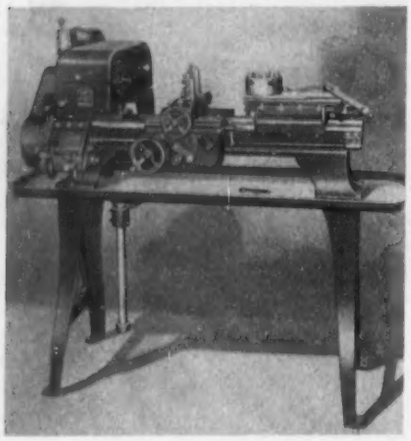
INDUSTRIAL EQUIPMENT

Turret Lathe

Handling bar stock up to and including ⅝-inch diameter, a new quick change gear turret lathe is announced by Logan Engineering Co., 4901 West Lawrence avenue, Chicago 30. Its features include



precision preloaded ball bearing spindle mounting; adjustable gibs; and self-lubricating bronze bearings. Bed ways are ground to within 0.0005-inch of absolute accuracy, total run out of headstock spindle 12 inches from the bearing less than 0.001-inch; lead screw held to within 0.002 inch in 12 inches; and turret holes bored from the headstock.

The gear box on the lathe provides 48 threads and feeds in either direction to the carriage. Adjustment of two levers makes screw threads from 8 to 224 per inch available and by changing the 24 tooth stud gear for the 48 tooth stud gear furnished with the lathe, additional threads of 4 to 7 per inch are accessible. Longitudinal power feeds from 0.0015 to 0.1000 inch per revolution on the spindle are obtainable. Another feature of this machine is its automatic apron which operates from a spline in the lead screw through a worm drive friction clutch for both longitudinal and cross feeds. For cutting threads, an additional longitudinal drive operates from half nuts on the lead screw. A safety feature makes it impossible to engage both drives at the same time. Worm and gear operate in a bath of oil.

Electrode Holder

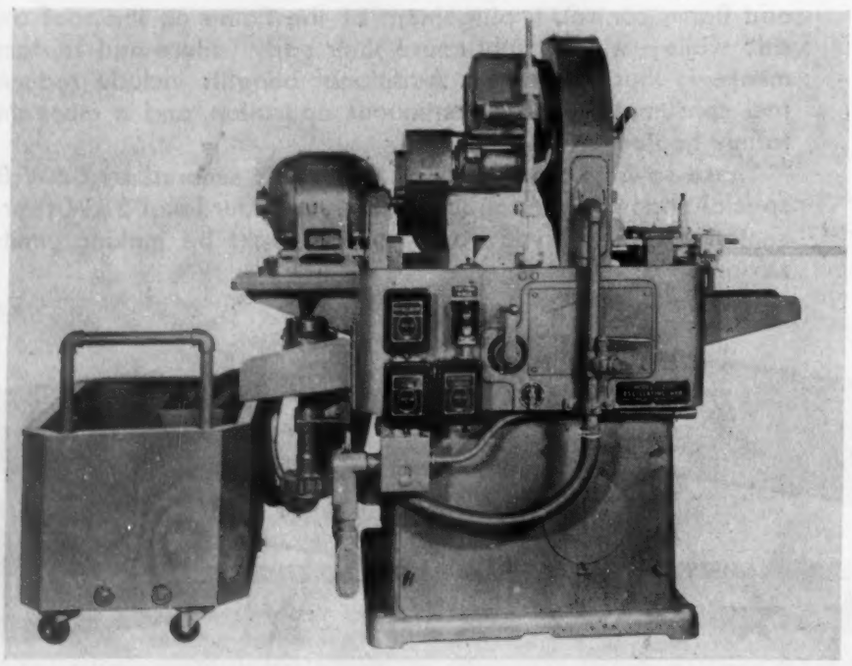
Having a current rating of 300 amperes with ample capacity for overload, the new holder announced by Lincoln Electric Co., 12818 Coit road, Cleveland, will handle various sizes of electrodes ranging from 1/16-inch to ¼-inch diameter inclusive. Jaws made of high conducting and wear resisting copper alloy known as Lincalloy, will withstand rough treatment and are fully guarded

from contacting the work by durable spring steel insulating guard that is replaceable. The trigger of the holder is of molded, heat-resisting inorganic material.

Other features of this electrode holder include hollow, air-cooled, heat-resisting fibre handle and performance on both alternating and direct current.

Cutting Machine

Model 213 abrasive cutting machine offered by Andrew C. Campbell Division, American Chain & Cable Co. Inc., Bridgeport, Conn., features an oscillating head.

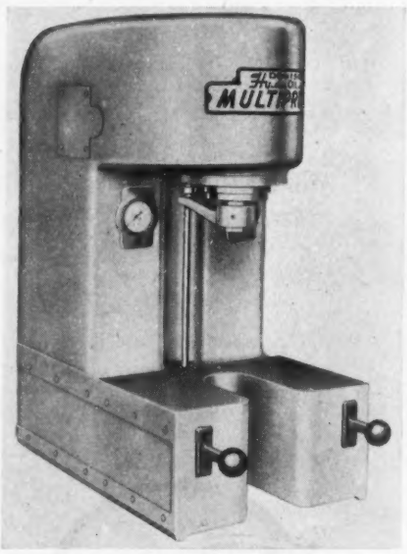


It makes clean cuts without burning or changing the physical properties of stock with closer tolerances because of the use of constant light hydraulic pressure on the wheel when cutting any diameter of stock up to the capacity of the machine. A separate coolant tank helps keep the machine cooler and eliminates chip accumulation. The unit cuts up to 2½-inch solid stock and 3½-inch tubing.

It is powered by a 7½ horsepower motor and has a spindle speed of approximately 2100 revolutions per minute.

Bench Press

Designated as Multipress because it is basically an oil hydraulic press of many uses, the new bench press introduced by Denison Engineering Co., Columbus, O., will deliver up to 4 tons downstroke pressure and up to 5000 pounds "pull up" pressure. It is designed to utilize a wide variety of accessories and fixtures with which it can perform production operations such as pelleting, honing, broaching, peening, assembling, burnishing, straightening, etc. Operation of the unit is accomplished by depressing the



control levers which cause the ram to move downward. Releasing either lever stops the ram instantly. Releasing the other lever, causes the ram to return to its upper limit, where it is positively held. By slowly depressing the hand levers, the ram can be "inched" downward slowly and positioned exactly above the work before pressure is applied. Full pressure can be applied upon work at once, by completely depressing the levers at once, or can be increased gradually by depressing levers slowly. The eye level gage indicates pressures. Dual controls require the use of both of the operator's hands.

Ram speed can be regulated and ram travel upward is adjustable by means of a movable stop-collar on the shipper rod in the throat of the unit and can be preset for strokes from 6 to 1/16 inches. Provision is made for attaching tools

(All claims are those of the manufacturer of the equipment being described.)

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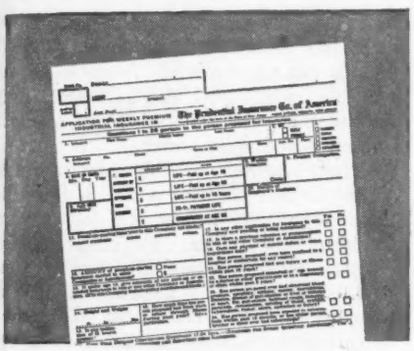
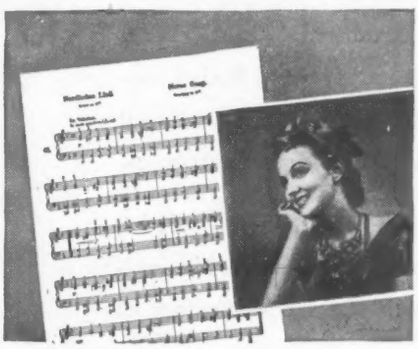
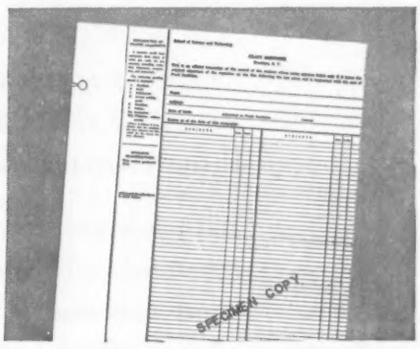


At the Prudential Insurance Company, Newark, New Jersey, applications for industrial insurance are reproduced with Ozalid. The originals are kept on file and Ozalid prints are attached to the policies. Prudential changed their form, adopting a translucent sheet with printing on only one side, so that they could utilize OZALID.

At Alpha Music, New York City, music arrangements, drawn in ink, are reproduced with Ozalid. Performers on such radio programs as Coca-Cola's "Pause That Refreshes," Evening in Paris's "Here's to Romance," or any of the CBS shows from New York, are reading from easy-to-follow Ozalid Prints. Ozalid Dry Photos are also made.



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A REDISTRIBUTION SERVICE

THE Commodity Clearance Company is a private undertaking organized to provide a permanent redistribution-service for private industry. We are prepared to list surplus inventories of such material as steel, aluminum, copper and copper-base alloys, in mill form; chemicals; textiles; machine tools and other equipment, both new and used.

Representative items of all surplus materials and equipment recorded with us are published in the CCC MARKETER, a semi-monthly publication similar in format to the former WPB Redistributor. The CCC MARKETER is available without charge to any responsible user of such surpluses.

Full information regarding our service will be forwarded, without obligation, to reliable concerns interested in locating or disposing of surplus inventories.

CCC

COMMODITY CLEARANCE COMPANY

212-222 Rose Building

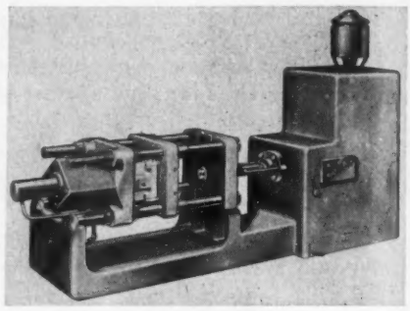
CLEVELAND 15, OHIO

Telephone MAin 1956

to the end of the internally threaded ram. A 3 horsepower electric motor furnishes power. A pressure gage is located in the throat of the unit. The ram is guided and prevented from rotating by the banjo-type ram guide which travels on the shipper rod. A U-shaped opening in the base permits numerous assembling, disassembling, stamping and punching applications.

Die Casting Machine

H. L. Harvill Mfg. Co., Los Angeles, announces a new cold chamber die casting machine for use primarily as a machine tool. The machine features a patented die locking toggle arrangement for positive die closing. A two-stage hydraulic system is incorporated in the design, delivering an emulsified water hydraulic fluid at low pressure to operate components of the machine and delivering high-pressure fluid for the injection of aluminum, magnesium and copper base alloys. Pressure of the injection piston on the molten metal may



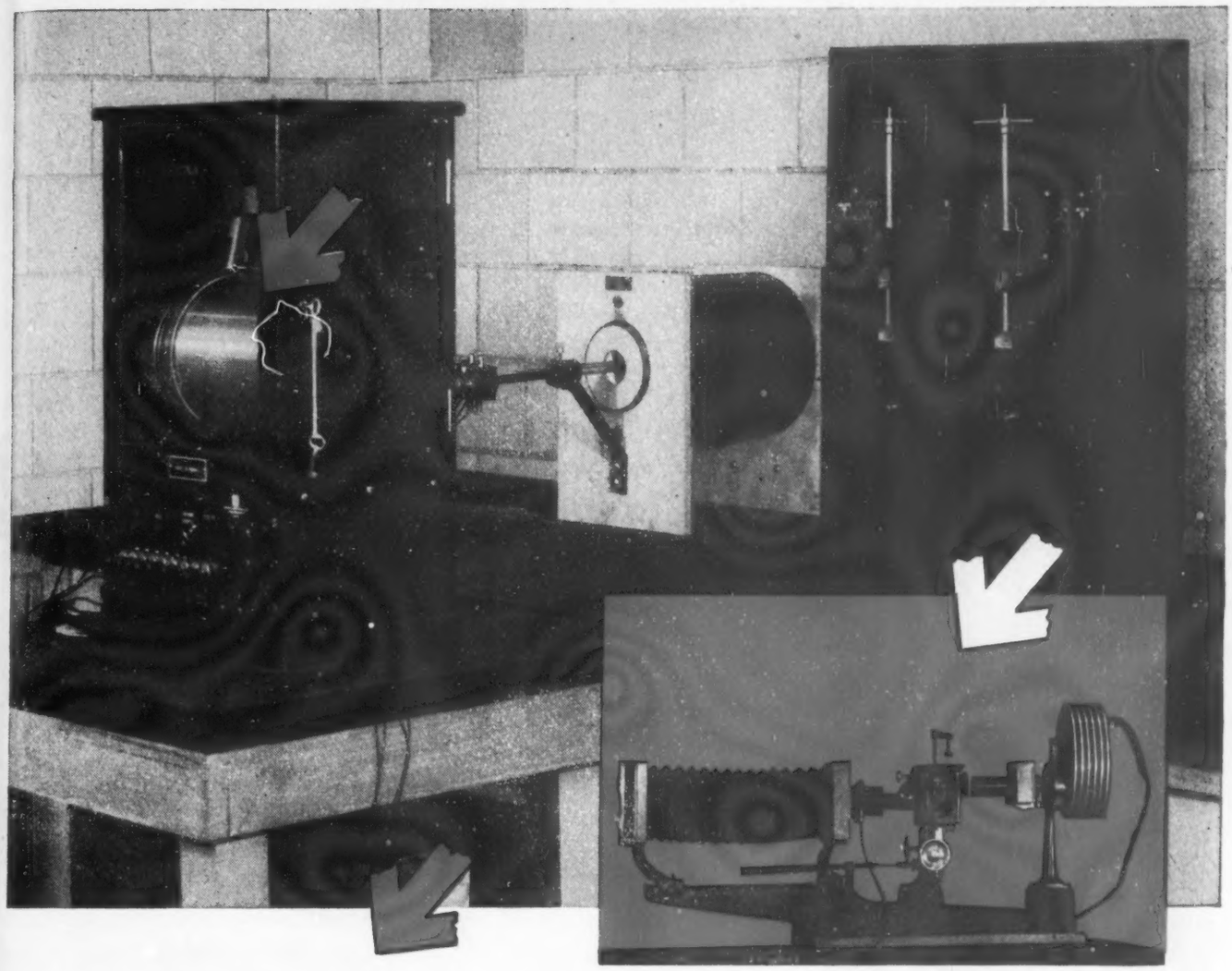
be as high as 88,000 pounds per square inch, the normal pressure being 35,000 pounds per square inch. In the event of multiple installations, the individual unit system may be replaced by a central source of hydraulic power.

Other features of this unit include ability to pull cores of a die in four directions and the height and location of the injection cylinder. The standard machine is an all-purpose die casting machine and serves as a basis for design of special-purpose machines. Construction features heavy tie bars and oversize platen bearing, T-slots are provided in the platen. The movement of the planes allows for wide die opening to facilitate casting removal and die mounting. Automatic timing controls regulate all operations except ladling of metal.

Level Lubricator

Designated as style B, an improved constant level general purpose lubricator is introduced by Oil-Rite Corp., 3409 South Thirteenth street, Milwaukee 7, Wis. It is used on machine tools, milking machines, electric motors, line shafting, counter shafting, pillow blocks, as automatic oil gages, etc., wherever bearings and machinery parts must be provided with a supply of lubrication.

The operation is based on the physical law that all fluids seek their level. When the reservoir is filled with oil, only enough



Your Structure is Better.. IF THE

STEEL STRUCTURE IS CORRECT

The whole story of a steel section is bound up in the tiny, individual grains of the steel—their size, nature, position, and relationship, one with another. That's why it is important to you that PSF has and *uses* in its constant laboratory testing, such equipment as the Critical Range Apparatus for determining transformation points of steel, illustrated above, and the Photo-Microscope shown in the inset. They're part of the reasons why castings by PSF, aside from dimensional accuracy, have the clean soundness and strength needed to realize your best hopes for *your* product.

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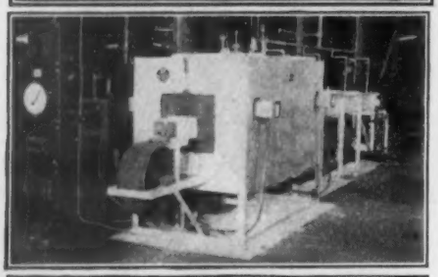
EF FURNACES

For Every Industrial Heat Treating Process

We Build the Furnace to Fit the Job

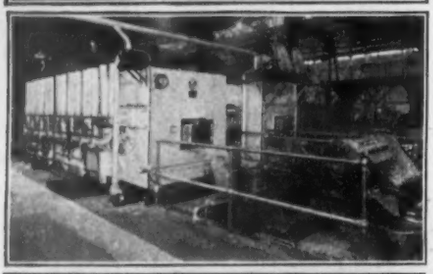
For Sintering Powder Parts

Pressed metal powder products are sintered continuously in the EF special atmosphere roller hearth furnace shown at left. Heats 800 lbs. per hour. Other EF installations are fusing powder metals on strip, etc.



For Brazing and Soldering

Aluminum, brass, copper and steel assemblies are being joined in EF continuous and batch type furnaces. Strong leak-proof joints are made and the complete assemblies are discharged clean and bright. Send for circulars.



For Hardening Small Parts

175 to 2000 lbs. of small and medium size parts and products per hour are scale free hardened in EF continuous chain belt furnaces such as shown at left. We build them either electrically heated or fuel fired. Send for circulars.

Rotary Hearth Furnaces

Various sizes and types for heating billets for rolling, extruding, etc.; heating for forging, and various other heating and heat treating processes. We build them fuel fired or electrically heated.

Submit your production furnace problems to EF engineers

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production

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Drawing
Enameling
Forging
Hardening
Malleabilizing
Silver Soldering
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We Build the Furnace to Fit Your Job

THE ELECTRIC FURNACE CO.

SALEM, OHIO

ELECTRIC FURNACES FUEL FIRED

No Job Is Too Large or Too Unusual

oil will be released from the reservoir to bring the level in bearing oil well to the oil level line marked on the bars of the lubricator. When the bearing oil level falls, air is admitted into the reservoir through a vent, automatically releasing enough oil to restore the original level.

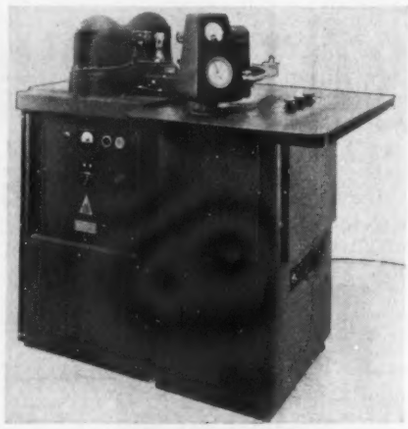
Construction consists of two parts. The base has bottom and side outlets for oil either or both of which may be used for bearing feed. Large air vents can be connected to a filter or to a breather tube on the bearing. Oil level is definite

and clearly marked on the outside. Large passages for oil and air permit easy flow of lubricant with heavy oils. A thumbscrew permits removing of reservoir for refilling.

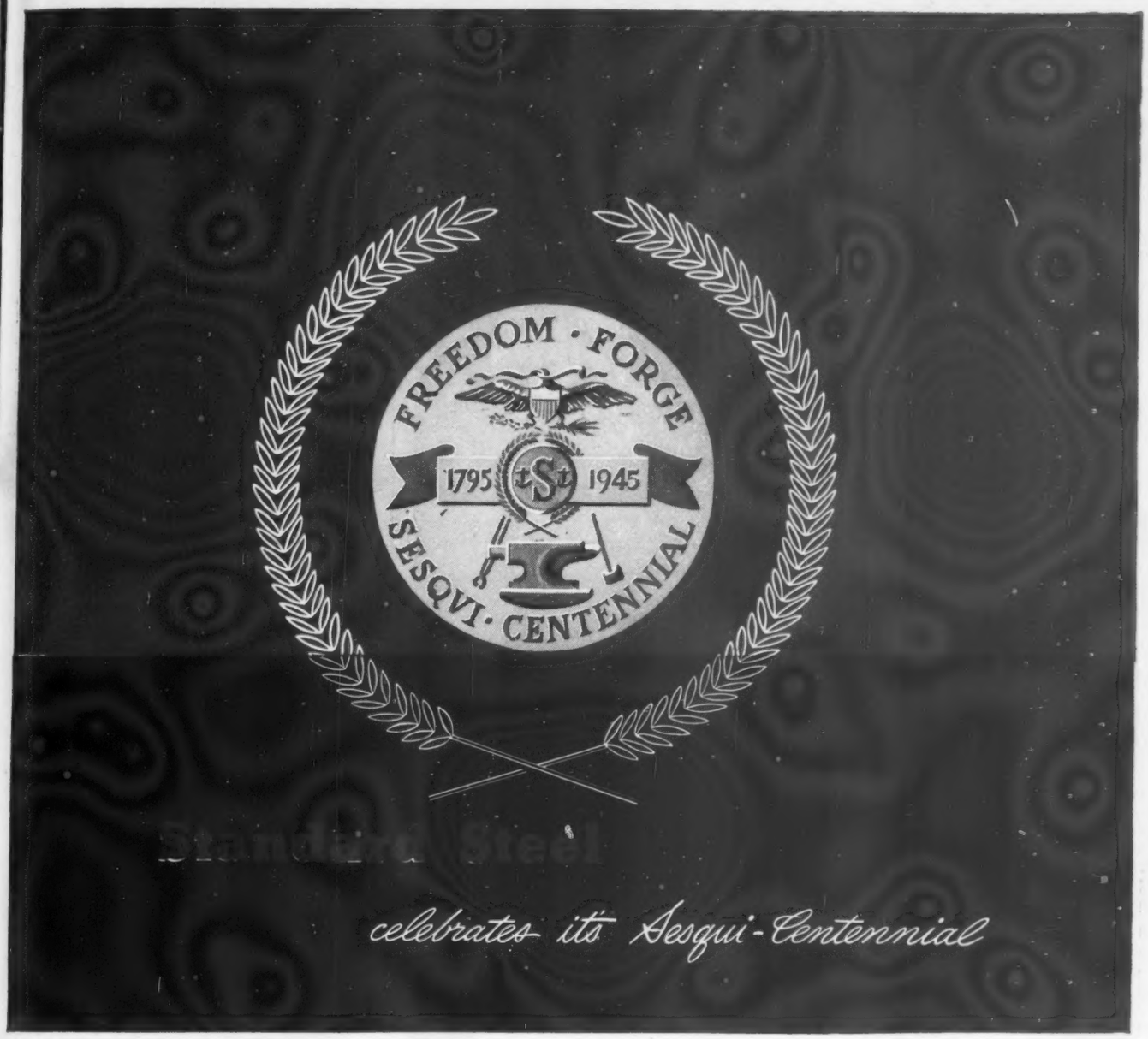
The reservoir is sealed to a collar with a new type of plastic cement, which is not affected by oil, water, heat or acid. A spring stopper prevents spilling of oil when filling. These lubricators are available in five sizes with capacities of 1, 2, 4, 8 and 16 ounces.

X-Ray Unit

The new spectrometer introduced by North American Philips Co. Inc., 100 East Forty-Second street, New York, provides an accurate method for measuring distribution and intensities of X-ray reflections. A scanning device, having a Geiger counter tube arranged to traverse a graduated quadrant, is used in com-



bination with suitable scaling circuits. The intensity measurements are quantitatively accurate and can therefore be used to determine composition of crystalline mixtures. In actual operation, the specimen inserted in the specimen holder intercepts the X-ray beam and deflects portions of it at various fixed angles. When the Geiger counter tube is moved around its quadrant, it measures angular



Midway in Washington's second term, Freedom Forge craftsmen began the production of essential metal parts for the infant industries of the infant republic . . . and forged the first link in a chain of service that extends unbroken up to today.

Of the American inventions that are commonplace in this generation, only the lightning rod, the submarine torpedo, the steamboat and the cotton gin had already been developed. The first railroad was still 35 years in the future, and the airplane over a century away.

Now the wheels and axles of countless locomotives; the base and cylinder of presses that form parts for the airplane maneuvering overhead; the castings and forgings that help power our ships, absorb recoil on anti-aircraft guns, and provide the track on which battleship turrets roll—may all come from Baldwin's Burnham plant. This plant is the direct descendant of Freedom Forge, now in its 150th year at the same location.

When you need dependable, quality forgings and castings for responsible jobs, this accumulated experience is waiting to serve you. Standardize on Standard. Baldwin Locomotive Works, Standard Steel Division, Burnham, Pennsylvania, U. S. A. Offices: Philadelphia, New York, Chicago, Washington, Boston, Cleveland, St. Louis, San Francisco, Houston, Pittsburgh.

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STEEL FORGINGS & CASTINGS

(SEE PARTS BELOW)

Estimated Savings per Ton of Steel Used $139.00

SPEED CASE STEEL

A LOW CARBON OPEN HEARTH PRODUCT

HIGH SPEED PRODUCTION

- Machined at 230 S.F.P.M.
- Increased Ductility
- Longer Tool Life
- Eliminated Annealing

BUY WAR BONDS

Ductility

SPRING RETAINER SCREW... The three pieces show production steps in making the oddly shaped finished part. 5/16" round *Speed Case* bar was machined at 230 s.f.p.m. to the ball end form, then cold forged to the disc shape with center projection; then the shank was cold bent. *Speed Case* is the only steel that would cold forge and still provide sufficient ductility in the projection to rivet, without intermediate annealing.

Our Metallurgists Are At Your Service.

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PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

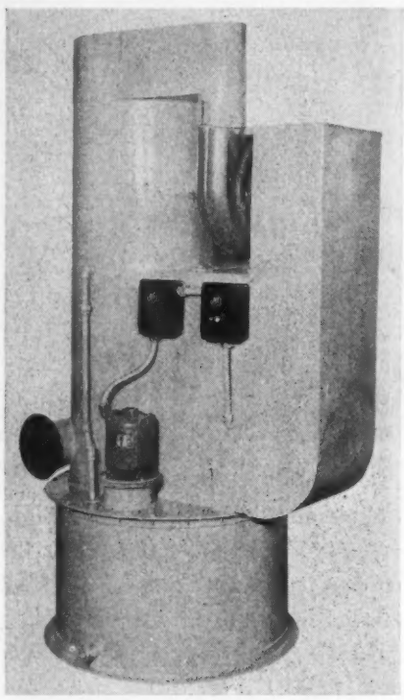
displacement and intensity of the deflected beams. A direct current microampere meter reads intensity—the quadrant, marked in degrees, shows diffraction angles. A stepping counter, employed in conjunction with a scaling circuit, provides a means of exacting quantitive determination of intensity.

Applications of this instrument include analysis of paint pigments for relative amounts of different crystal forms; identifying silicate and phosphate scale, determining nature of chemical reactions between scale products; identifying deposits on filters, valves, bearings, etc., determining the degree of alloying of metal powder mixtures at different sintering temperatures and measurement of retained austenite in steel.

Power for the spectrometer unit is taken from a 115 volt, 60 cycle alternating current outlet.

Dust Collector

Known as model E.C., Claude B. Schneible Co., 2827 Twenty-fifth street, Detroit 16, announces a new self-contained wet type dust collector. It is available with capacities from 400 to



5000 cubic feet per minute. The unit is suitable for handling dust from grinding or polishing machines, blast cleaning equipment or any of the smaller foundry operations.

Collet Chuck Drill Adaptor

A positive-drive collet chuck drill adaptor is announced by Zephyr Mfg. Co., Inglewood, Calif., which permits the use of broken flute ends of twist drills. Drills are held securely and concentrically without threading or soldering. No special tools are required.

A flat notch is rough-ground on the broken end of the drill before insertion

Everyone Has An Economic Stake In

INDUSTRY'S No. 1 PROBLEM

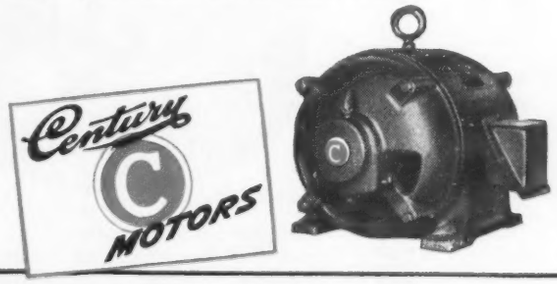
...and CENTURY MOTORS Help to Increase and Maintain Jobs by Aiding Manufacturers to Produce More and Better Goods at Lower Cost

Thousands of manufacturers of production and processing equipment and the plants that use this equipment are realistically planning to increase and maintain jobs and job security for millions by improving production methods, which, in turn, will result in more and better goods at lower costs.

How Century Motors Help Producers to Effect Lower Costs

Production and other processing equipment play a vital part in building and maintaining postwar prosperity, and electric motors are production tools, too — being a component part of the machines they drive.

The production advantages of Century Motors include the great variety of motor types available to match the functional characteristics of machine operation — their unusual freedom from vibration that contributes to closer tolerances in high speed, precision work — motor protection that means uninterrupted production in spite of hazardous atmospheric conditions — a keep-a-running ability that spells continuity of operation — permanently quiet operation that conserves human energy — and many other Century features that reflect lower final costs.



An Individual Organization Job

The answer to Industry's No. 1 Problem must come from each individual organization — not business as a whole. American enterprise can increase jobs and maintain job security at high wages only by each and every company improving its production methods. As a result, John Q. Public will be able to buy more and better goods at lower cost.

Century's Organization Helps, Too

The nation-wide organization of Century Motor Specialists is helping machine tool builders and appliance manufacturers to effect savings in original design as well as savings in production output. These men can be of greatest help while your design is in the blueprint or experimental stage.

We All Have a Stake in the Final Result

Whether you are a manufacturer of consumer products or industrial equipment, a wholesaler or retailer — you, too, have a direct or indirect stake in this problem of delivering a better product to the final user at a lower cost.

Act Now! If you are a manufacturer of motorized equipment or appliances, it may pay you to call the nearest of Century's 31 branch offices. Century may well aid you to make better products at lower costs — so that more people may buy.

CE-414

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We're Saving DIAMONDS Here!
Diamond consuming rough grinding is eliminated by precise adjustment of insert in TUNGTIP carbide milling cutters. Only finish grinding is necessary. TUNGTIP blades are accurately positioned by screw mechanism.
Save Diamond Wheels...Save Grinding Time...
Save Adjustment Time...Save Tungsten Carbide

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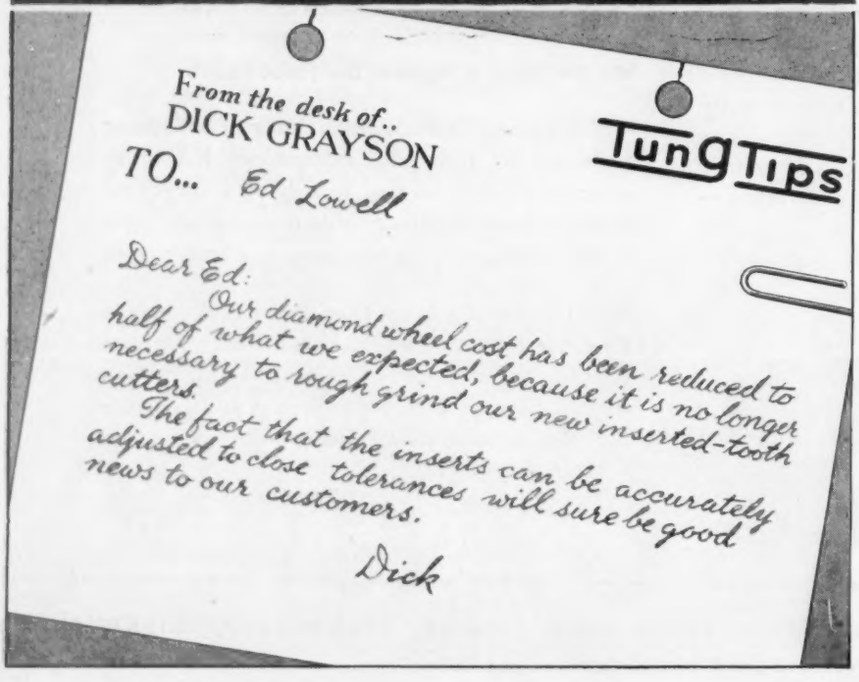
LOWELL & GRAYSON...formerly Grayson Manufacturing Co.


From the desk of..
DICK GRAYSON
TO... Ed Lowell
TungTips
Dear Ed:
Our diamond wheel cost has been reduced to half of what we expected, because it is no longer necessary to rough grind our new inserted-tooth cutters.
The fact that the inserts can be accurately adjusted to close tolerances will sure be good news to our customers.
Dick

into the collet. The notch slides past a pin located at the bottom of the collet. In operation this pin does the driving; the collet holds the drill in alignment; the collet nut locks the drill in place.

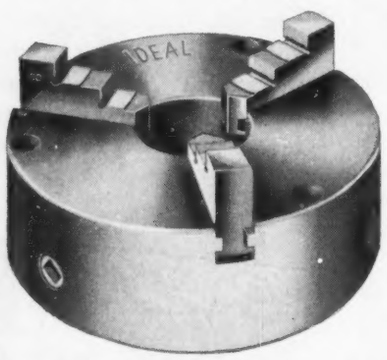
Electrode Holder

Designed to allow unobstructed visibility while welding and maximum accessibility even for deep pocket work, a new electrode holder is introduced by

Hollup Corp., Chicago. It increases the usable portion of the electrode to the uncoated end of the rod. With this holder, designated as Shortstub, ½-inch is required for a tight current contact in the holder jaw. An extension of the holder itself permits the new usable stub end of the rod to be projected into the proper position for welding.

Three-Jaw Chuck

Ideal Commutator Dresser Co., 5076 Park avenue, Sycamore, Ill., announces a new three-jaw chuck. It is precision



made to assure accurate turning. The body is of fine grain, high tensile strength semi-steel. Ample resistance to shock, load and unusual stress is provided by rib construction.

Two sets of jaws are provided, one for

Sulphite-Treated
Alloy and Special Steels

BENEFITS TO USERS

- ✓ 25% Greater Machining Speed
- ✓ 200% Longer Tool Life
- ✓ Fewer Rejections
- ✓ More Uniform Physical Properties
- ✓ Fewer Operations
- ✓ Better Finished Product

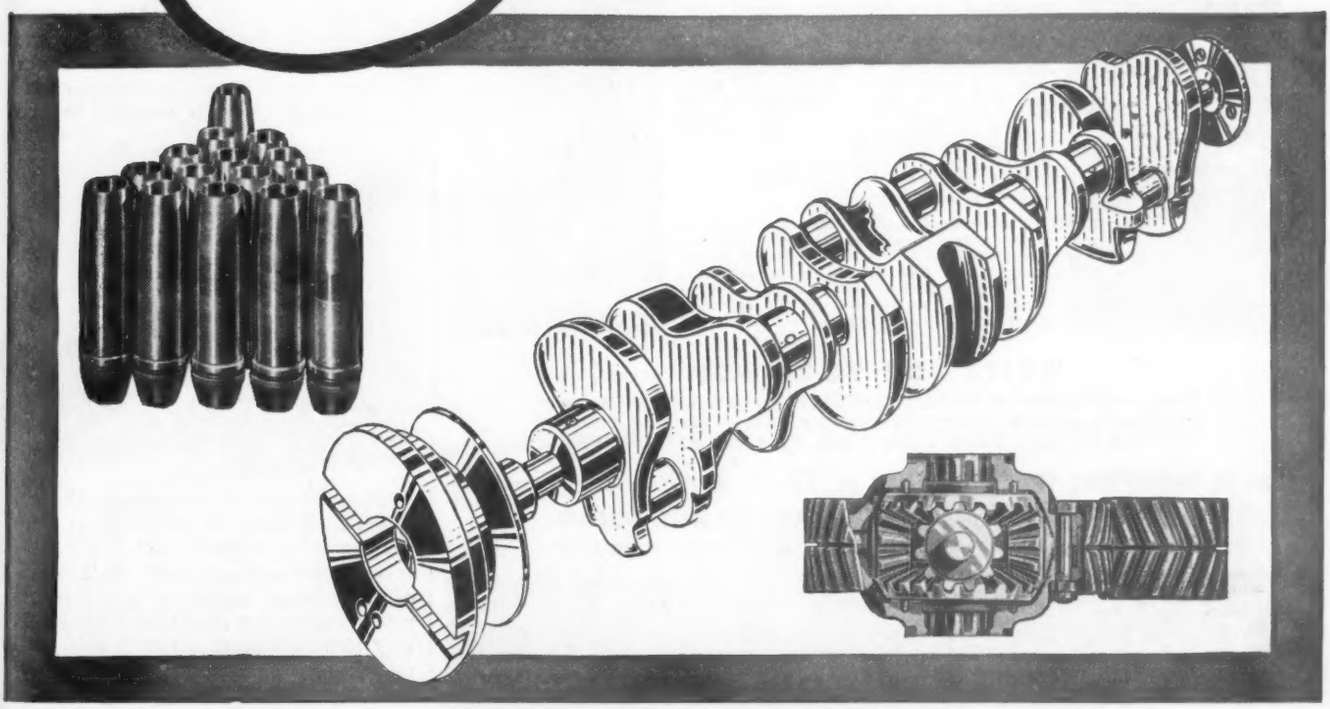
SULPHITE-TREATED alloy and special steels, which we have produced for a number of years, have solved many problems for steel users. They have been most satisfactorily applied where machinability is of first importance.

Sulphite treatment can be applied to most types of steel. It has been used successfully in the production of shells, crankshafts, camshafts, axles, and gears.

If you believe that your company may have an application for sulphite-treated steels, our sales and metallurgical staffs are at your service. We have accomplished satisfactory results for others and are ready to serve you in the same way.

WISCONSIN STEEL COMPANY

Affiliate of International Harvester Company
General Offices: 180 North Michigan Avenue, Chicago 1, Illinois



IS YOUR PROBLEM ONE OF MAINTAINING PRODUCTION WITH LESS *Manpower?*

Proper use of mechanized material handling equipment can help offset manpower losses. Most plants find that a Baker Truck—with a single operator, will release a number of men for other duties. Faster handling of materials speeds production in other ways, too. If you have a manpower problem, the actual case histories below may offer a solution. Many more are reported in the New Baker Catalog.

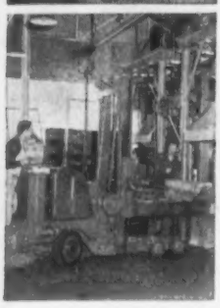
★ ★ ★ ★ ★

One company writes "With our Baker Truck we increased storage area by stacking, releasing valuable space for production . . . We were able to save the labor of six men and speed movement from receiving platform to storage—saving elevator tie-up . . . we removed the ever-present danger of strains and hernias." (See illustration at left.)

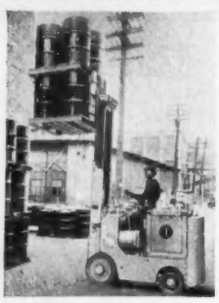
Records show that one of the first ram trucks, introduced by Baker in 1922, realized savings of 35 man hours per carloading for a steel mill. Today ram trucks are standard equipment for handling coiled materials. Illustration at right shows one of a fleet of Baker Trucks in the world's largest, most modern stainless mill.

"Womanpower" has replaced lost manpower and helped maintain production in thousands of plants. Because of their extreme ease of handling, Baker Trucks are ideal for women operators. Illustration at left shows a truck in service at a plant of the world's largest aluminum producer.

A fleet of eight Baker Trucks keeps the plant of a large domestic range manufacturer—now engaged in turning out war goods—at top production. Trucks service machines with materials to keep them running without interruption. Faster movement of parts and products in plant, warehouse and on loading platforms has cut handling costs 75%. (See illustration at right.)



An important factor in maintaining production in a large aircraft plant is the minimizing of "down-time" of large presses. The Baker Die Handling Hy-Lift Truck makes quick work of removing or placing dies in position—and simplifies their storage. (See illustration at left.) This plant also uses Baker Crane Trucks for speeding operations on the assembly line.



The problem of handling efficiently the wide variety of materials at a large chemical manufacturing plant is solved by a fleet of Baker Fork Trucks. (See illustration at right.) In carloading operations alone, on a conservative estimate, one Baker Truck replaces seven men with hand trucks.

WRITE FOR YOUR COPY

Plant and production managers, traffic managers, superintendents, purchasing agents and any others concerned with material handling will find the new Baker Catalog No. 52 a valuable reference.

BAKER INDUSTRIAL TRUCK DIVISION *of The Baker-Raulang Company*

2167 WEST 25th STREET • CLEVELAND, OHIO

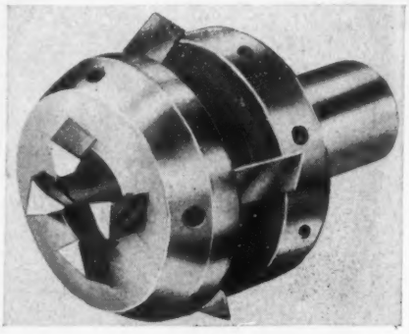
In Canada: Railway and Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

internal and the other for external work. The jaws are made of specially treated alloy steel to give toughness and strength. If one jaw is damaged, it can be replaced. The chuck is available in a 5-inch size. A mounting adapter is provided with each chuck so that it may be fitted to the particular lathe on which it is to be used.

Cutter Blades

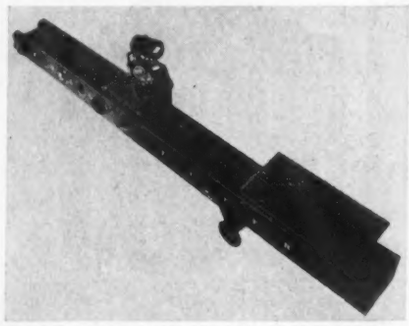
Cutter blades manufactured by Weddell Tools Inc., Rochester 7, N. Y., are now applied to hollow mills. The triangular tool bits fit into triangular shaped holes in a hollow mill cutter body, each



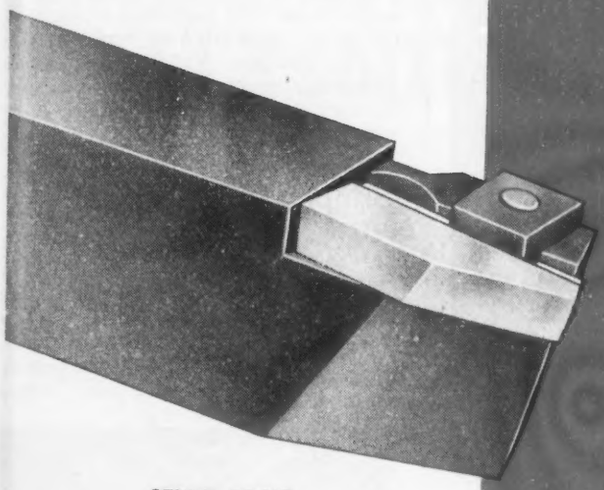
locked or unlocked by a single lock screw. The blades are backed up and adjusted by single adjusting screws or all may be simultaneously adjusted by a single adjusting nut. There are no slots in the cutter body as the cutter blades fit into holes which permit the cutter body to be tied together all around the diameter. These hollow mills are provided with standard blades of high speed steel, cast alloys or carbide tipped. They are made with solid shank, shell type, with special piloting bodies, or to incorporate drills or reamers.

Conveyor

Designated as the Tote-All conveyor, a lightweight, portable endless belt type conveyor is announced by Coaltoter Conveyor Co., 310 South Michigan avenue, Chicago 4. It is available in two



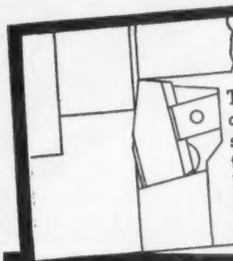
lengths, 13 feet, 9 inches and 20 feet. Either model may be driven by an electric motor or a gasoline engine. Conveyor comes equipped with a 1½ horsepower gasoline engine or a 2.3 horsepower engine for heavy duty work. It may be had without a power unit. All models may be obtained with a standard engine mounting or a high engine



STYLE 12 HD
(OPPOSITE HAND–STYLE 11 HD)

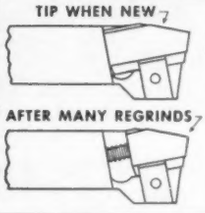
Introducing — KENNAMETAL "HD" TOOLS

WITH CLAMPED-IN, ADVANCEABLE KENNAMETAL TIPS



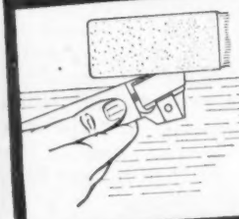
"HD" TIPS ARE STRONG

Tip is firmly supported—underside is diamond ground, and rests on plane surface of recess which is finished true with Kennametal Milling Cutter or End File. Thermally strain-free assembly also helps prevent tip breakage.



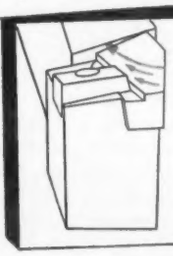
MAJOR PART OF TIP USED

When dull, tip can be advanced, and resharpened time and again, until the major part of it has been used.



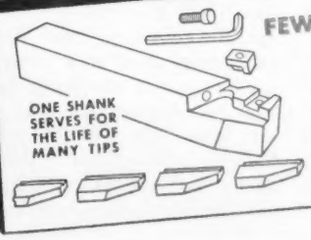
ECONOMICAL REGRINDING

Only the tip is reground—no shank steel is removed. Operation is fast—clogging of diamond wheel grinder with steel is prevented.



STREAMLINED DESIGN

Smooth, unimpeded chip flow assured by improved clamping arrangement, correctly positioned. HD design employs pressures set up in cutting as factors to help hold tip in place.



FEWER TOOLS REQUIRED

Many tips can be used during the life of a shank, and tip of suitable Kennametal composition can be used for each job.

for HEAVY-DUTY Machining on Steel and Cast Iron

Kennametal HD Clamped-On Tools make practicable high rate carbide machining on heavy steel forgings, castings, and bar stock, and cast iron, because the strength of the special HD tips and the perfected design of the tool enable deep cuts and heavy feeds to be taken at intermediate speeds, with amazing tool life.

HD Tools are now available in two styles —11HD and 12HD—for heavy duty turning and boring operations, with special HD tips in Grade KM for general steel cutting, Grade K2S for machining very rough or scaly steel castings, and Grade K6 for cutting cast iron. Larger sizes, i.e., with shanks 1" to 2" wide, are now being produced.

Catalog information, and prices, will be sent immediately upon request.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc., LATROBE, PA.

WHEN METAL IS IRCO-IZED METAL RECEIVES MAXIMUM PROTECTION

• The IRCO-IZING PROCESS is a chemical dip treatment for iron, steel, zinc and cadmium . . . providing a rust inhibiting base for paints . . . or a final finish.

The IRCO-IZING PROCESS Is employed to increase the life of any paint finish applied over iron, steel, zinc or cadmium. This increased life is due to; insuring a chemically clean grease-free surface for paint. Provides a rust-inhibiting surface. Provides a non-conducting bond between the metal surface and the paint.

The IRCO-IZING PROCESS is employed to provide a rust-resistant finish to ferrous metals. This is provided by; converting the ferrous surface to a non-water soluble phosphate which is non-conductive. It provides an absorbent surface thus assuring *maximum paint adhesion and protection against* corrosion.

We have a large well-organized engineering staff that will be pleased to discuss your production problems. The IRCO-IZING PROCESS is simple and on many occasions we have been able to set-up the IRCO-IZING PROCESS with tanks and equipment already on hand. IRCO-IZING chemicals is always available and we can assure immediate delivery.

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THE IRCO-IZING PROCESS MEETS ALL GOVERNMENT SPECIFICATIONS CALLING FOR PHOSPHATE COATINGS

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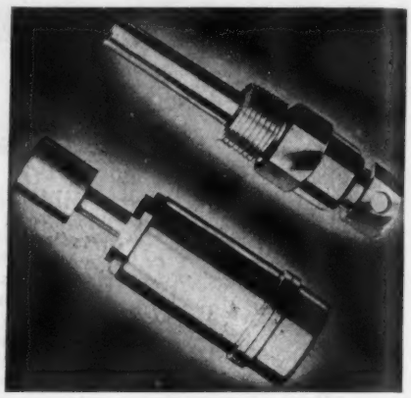
Manufacturers of
CORROSION SOLVENTS AND RUST PREVENTIVES

mounting for conveying bulky material. Engine mounting on models equipped with gasoline engines is adjustable to keep engine level regardless of angle of conveyor. Normal belt speed is 420 feet per minute. Variable speed drive pulley is available. The conveyor may be used for sand, gravel, brick, grain, salt, corn, clay, fertilizer, coal, etc.

Grippets and Plungers

Universal Engineering Co., Frankenmuth, Mich., announces two new products, grippets and index plungers. The grippets are complete single units which lock work in jigs and fixtures quickly. Installation consists of drilling and tapping a hole in the jig or fixture and inserting



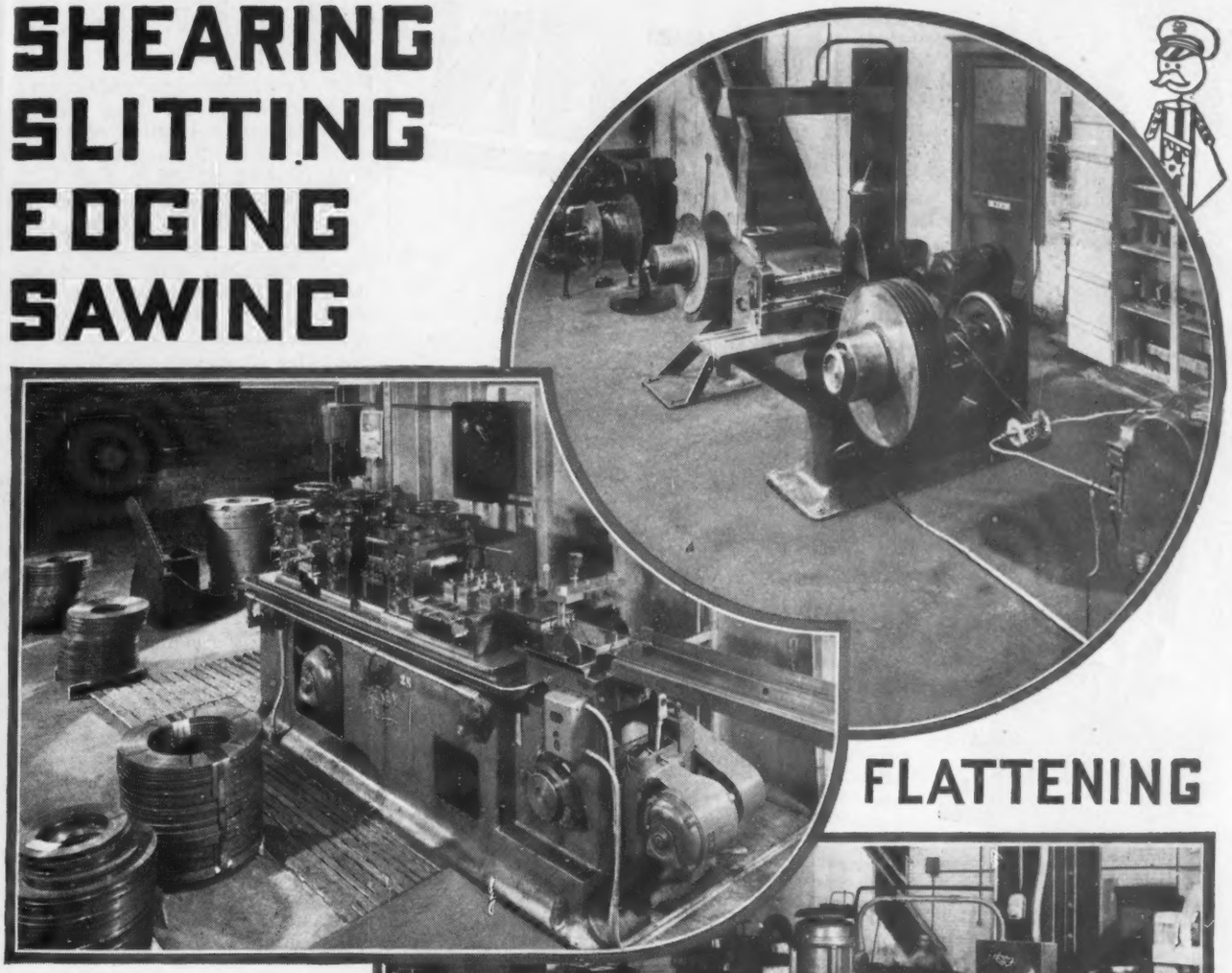
the grippet. No special adjustments are necessary. They prevent breakage and eliminate vibration. They are recommended for shops in which continuous handling of jig and fixture work is necessary.

Index plungers are also used in jig and fixture work and eliminate the machining of special indexing plungers for multi-station tools. Made in three standard sizes, the plungers are complete and ready to be installed. Plunger assembly can be assembled from either top or bottom and removed in either direction by taking off a hex nut. Both plunger body and taper bushings have the same diameter. The locating bushing, the plunger and plunger bushing are hardened and ground.

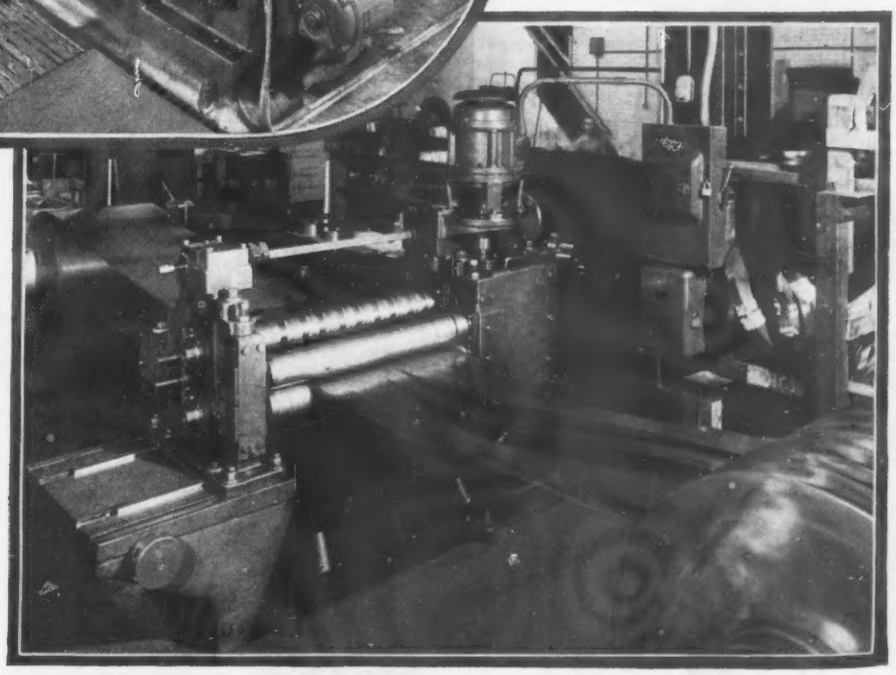
Tool Holders

Armstrong Bros. Tool Co., 301-357 North Francisco avenue, Chicago 12, announces the extension of their line of carbide tool holders and carbide-tipped cutters. These tool holders, designed for use with carbide-tipped cutters come with "straight", "right-hand offset" or "left-hand offset" shanks, each in seven sizes while the cutters come tipped with carbides of two grades—Armide red for machining steel and Armide gray, for machining cast iron, brass, bronze, aluminum and nonmetallic. All sizes of cutters come ground to four standard cutter shapes and in either standard or heavy duty weight. These carbide-tipped tools are for use in tool rooms, machine shops, maintenance departments, etc.

SHEARING
SLITTING
EDGING
SAWING



FLATTENING



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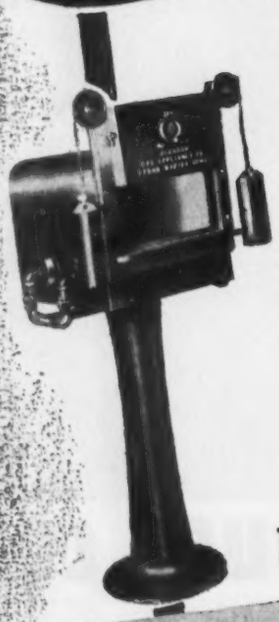
FURNACES

WHEN EVERY MINUTE COUNTS on the FIRING LINE

Install Speedy Johnson Units for QUICK Action. Save time as well as space and gas. Order Today!

No. 575 Pot-Hardening Furnace Fully Lined with 8" Insulation

Here's a pot-hardening furnace hard to beat. Fitted with automatic lighting device, No. 575 is heavily lined with 8 full inches of high temperature, high quality insulation. Lid-lifting mechanism easily raises lid and locks it in UP position. Burners located near top of combustion chamber insure longer pot life. Vent damper regulates exhaust gas flow. 3-Section top ring construction prevents distortion. Economical to operate. Steel pot 14" wide, 20" deep. Equipped complete with G.E. Motor and heavy Johnson Blower. $400 F.O.B. Factory.



No. 130-A Hi-Speed Steel Heat-Treating Furnace. . .

Counter-balanced door opens upward, so tools can be placed or removed without fully opening door — thus preventing temperature drops. Fire-box is 7¾" high, 13" wide and 16½" long. Equipped with Carbofrax hearth and ¼ H. P. blower, and lined with insulating refractory. Four-burner model, illustrated, for 1400 to 2000° F., complete with motor and blower, $295 F.O.B. Factory. 6-burner job for 1800 to 2400° F., complete, $325. Prices F.O.B. Factory.

There is a Speedy JOHNSON Unit for Every Heat-Treating Need. Write for Free Catalog Today!

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City_____

Metal Marking

(*Continued from Page* 100)

for manual and machine application differ in many respects. They may leave their mark on steel by impact, by direct pressure, or by rolling pressure. (See STEEL, Feb. 5, p. 120.)

Steel stamps which leave their mark by impact, being designed for use with a hammer, have a life expectancy directly dependent upon correctness of shape and proper tempering.[11] Composition of the steel going into the stamp is another important factor in its service life. One alloy much used is vanadium, insuring greater tensile strength. However, other alloys used will give similar results. Stamps for impressing symbols are coming into wider play, as are numbering-machine stamps, automatic or hand-operated, for numbering metal parts, name plates, metal checks, etc.[12]

Some plants utilizing hand stamps for identification of work will differentiate between operators and inspectors, or between different shifts and departments, by changing the border around a standard symbol designating one type of work. One company has been providing "different shift" stamps in which triangular, square, circular and oval border lines, respectively, appear around the basic numeral or symbol.[13]

Stamping by Impact Method

The impact method of stamping is favored where a considerable amount of data must be stamped, yet where sufficient impact to imprint all data simultaneously might distort the shape of relatively thin steel or other metal. This can be accomplished by arranging a holder like that shown in Fig. 24, which can be set or clamped into place on the work. In this instance a number of individual stamps are imprinted on the base of an artillery shell which is 6 or more inches in diameter. Each stamp is struck individually, slots in the inner side of each stamp in which a ring spring engages, hold them in replaceable position.

Steel stamps and dies for machine marking of steel likewise are designed for operating in a press, as well as in specially designed marking machinery, as discussed in preceding article. Roller dies, having the characters to be imprinted, cut around the circumference of a roller, and graduation dies are well established in industry.[14]

Where a steel stamp operating by pressure or impact cannot be used safely, special rubber stamps or dies, together with a suitable etching ink, sometimes become practical. One company in this field has a line of rubber inspection stamps that perform satisfactorily, and etching inks used with them will produce a permanent mark without the slightest injury to the metal.[15] There are rubber printing dies of the hand-operated, rocking type, used for putting trademarks and other sizable markings on steel with a minimum of difficulty. Marks may be permanent or removable, depending on the kind of marking ink used. Also

WHY Production Goes UP When Veelos Goes ON

1. You uncouple any length of belt you need from an economical stock roll of Veelos in less than 60 seconds. In another minute, it can be coupled endless and installed on the drive. *Veelos is adjustable to any length . . . adaptable to any drive!*

2. With a roll of Veelos, V-belts can be replaced in a few minutes. Machine downtime is drastically reduced. *Veelos maintains machine production!*

3. Veelos link construction provides quick, easy tension adjustment. This permits machinery to run at full speed and productivity. *Veelos ends belt slippage!*

4. On a multiple Veelos drive, all belts work together because each belt on the drive is adjusted to correct, uniform length to carry its exact share of the load. *Veelos delivers full power!*

Simple as Buttoning a Shirt

Get the "hang" of it, and you'll couple and uncouple Veelos as easily as you button your shirt. This unique, link construction is the big reason why production goes up when Veelos goes on. Write today for catalog telling the whole Veelos story.

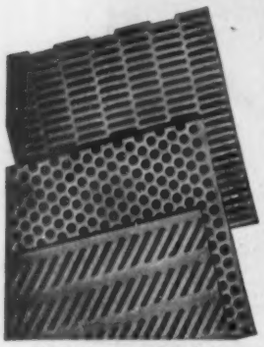
MANHEIM MANUFACTURING & BELTING CO. MANHEIM, PA.

VEELOS
THE LINK
V-BELT

Adjustable to any Length
Adaptable to any Drive

LINK CONSTRUCTION UPS PRODUCTION

PERFORATED metals



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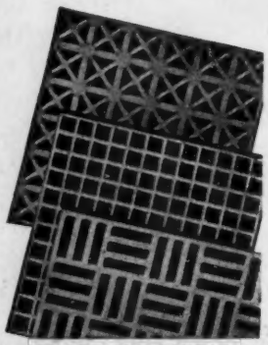
All standard sizes and shapes of perforations for different kinds and thicknesses of metal as required for many uses and industries.

All ornamental perforations of desirable patterns. Consult us on your specifications.

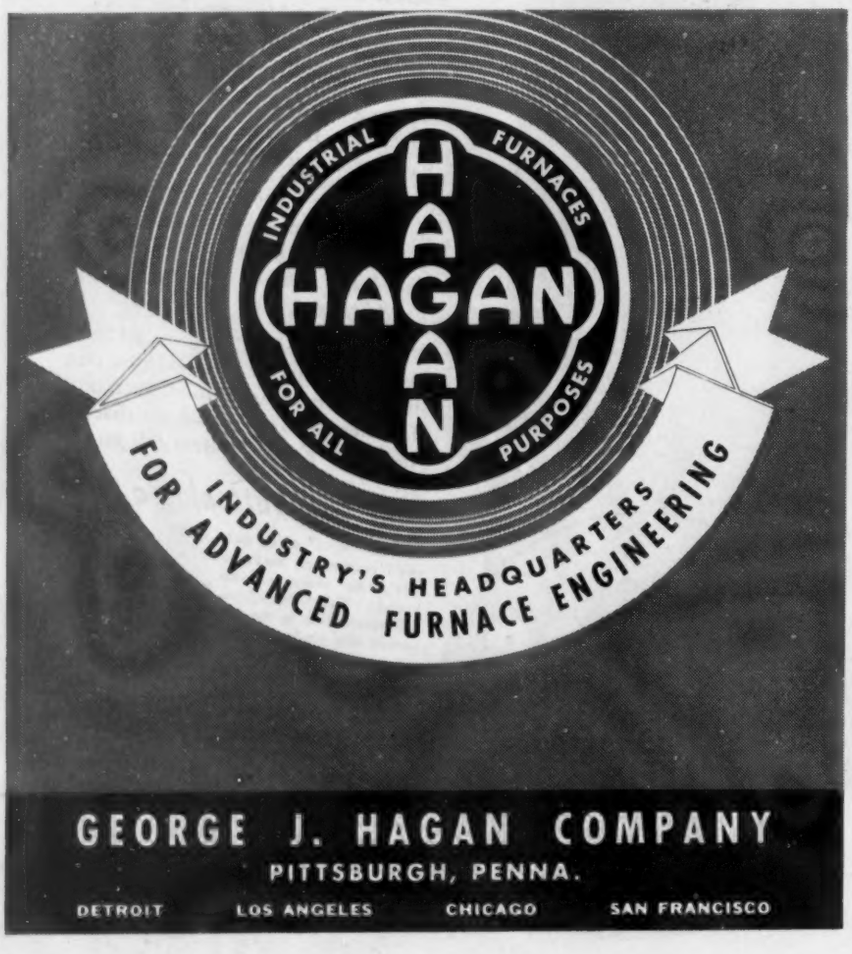


ORNAMENTAL

ANY METAL • ANY PERFORATION

The Harrington & King PERFORATING Co.

5634 Fillmore St., Chicago 44, Ill. 114 Liberty St., New York 6, N. Y.



available are rubber dies for producing etched imprints on steel, the mark being either stain-type or deeply etched.[16] Rubber dies are very clear, sharp and acid-resisting and are available for interchangeable applications and holders.

Choice of an ink for marking sheets or other steel products with assurance of highest efficiency is sometimes difficult without first trying a number of types to find the one best suited for the conditions to be met. There are marking inks for all technical, industrial and commercial uses—sheet metal ink, etching or non-etching varieties, liquid or paste, in black and in colors.[17] The extensive lines of inks for marking steel, celluloid, glass and other materials by rubber stamping or writing also includes special inks for printing on metals. Inks for metal and glass etching are available in many varieties from a number of manufacturers.

REFERENCES

1—Paints Sticks produced by Helmer & Staley, Chicago; American Crayon Co., Sandusky, O.; marking paints by Markal Co., Chicago.

2—Made by American Crayon Co., Sandusky, O.

3—Joseph Dixon Crucible Co., Jersey City, N. J.

4—Made by American Crayon Co.; Joseph Dixon Crucible Co.; Eastern Magnesia Talc Co., Burlington, Vt.; (pure talc) Chas. B. Chrystal Co., New York; Stanley Doggett Inc., New York; and Chas. A. Wagner Co. Inc., Philadelphia.

5—Layout dopes made by Tamms Silica Co., (for use on brass, aluminum, copper, tin, stainless steel, etc.); Michigan Chrome & Chemical Co., Detroit (for tool, die, pattern and template work); United Aircraft Parts Mfg. Co., Hollywood, Calif. (standard and special dopes to specification); and Dykem Co., St. Louis (blue dope for steel—pink for cast iron).

6—Brown & Sharpe Mfg. Co., Providence, R. I., makes single and double-point scribers (straight or bent) and type held in 2-jawed chuck.

7—Scriber with adjustable sleeve made by L. S. Starrett Co., Athol, Mass.; also double-point type threaded to fit holder and reversing point, pocket-type.

8—Elkonite-tip electric etching tools may be obtained from Brewster-Squires Co., New York.

9—Other etcher-demagnetizers (not shown) made by Luma Electric Equipment Co., Toledo, O.; Printz Electric Co., Detroit (both A-C and D-C models); and by Grinding Machinery Co., Detroit (used on Stellite and steel).

10—E. Karelson Inc., New York, manufactures diamond-writing tools.

11—Steel stamps for use with hammer manufactured by Hoggson & Pettis Mfg. Co., New Haven, Conn.; S. M. Spencer Mfg. Co., Boston; A. D. Joslin Mfg. Co., Manistee, Mich.; Dickey-Grabler Co., Cleveland; M. E. Cunningham Co., Pittsburgh; James H. Matthews & Co., Pittsburgh; Bethlehem Steel Co., Bethlehem, Pa.; Schwerdtle Stamp Co., Bridgeport, Conn., and others.

12—Numerall Stamp & Tool Co. Inc., Staten Island, N. Y., makes the stamps described.

13—Variable borders and symbols indicating shifts, etc., made by New Method Steel Stamps Inc., Detroit.

14—Roller-type dies made by Quality Die Co., Chicago; S. M. Spencer Mfg. Co.; A. D. Joslin Mfg. Co.; Dickey-Grabler Co.; and Schoder & Lombard Die & Stamp Co., New York.

15—Pannier Brothers Stamp Co., Pittsburgh, is a manufacturer of rubber stamps, inks and kindred products.

16—Rubber dies for etched imprints and facilities for "stain" prints and deep-etch printing can be obtained from Schwerdtle Stamp Co., Bridgeport, Conn.; and acid-resisting rubber stamps from Noble & Westbrook Mfg. Co., East Hartford, Conn.

17—Technical and industrial inks (including etching or non-etching, etc.), dies and die-

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HIGH TEMPERATURE SILICONE INSULATION

Humidity, the primary reason for failure of motors and other electrical equipment, is conquered by DC Silicone Varnishes. Even under extreme conditions of condensation, severe overloads or idleness in moist locations, DC insulated equipment starts and runs at full load.

High temperature silicone insulation was first made possible by DC Varnishes. These new heat stable resins are natural complements to the inorganic spacing materials—mica, Fiberglas and asbestos. Dow Corning Silicone Varnishes provide bonding and filling dielectrics which are highly resistant to heat, moisture, oil and chemicals.

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DOW CORNING 993 . . . available in commercial quantities, is a heat curing, high temperature stable silicone varnish for impregnating motor stators, transformer coils and other electrical equipment; for varnishing Fiberglas or asbestos served wire; for varnishing Fiberglas and asbestos electrical insulating cloths, tapes, tying cords and sleeving; for bonding Fiberglas and mica combinations.

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Weldco meets the requirements for those who need corrosion resistant tubing in standard or in odd sizes . . . in limited quantities or carload lots. Low setup charges combined with special Weldco facilities make all this economically possible for you. Weldco tubing is available in Monel, Inconel, nickel, stainless, or any weldable material. Best of all, it will meet your specifications for pressure and uniformity. Remember please, The Youngstown Welding & Engineering Co. has been in the specialty field for years, furnishing tubing to many manufacturers.

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Corrosion resisting fittings are available to meet your special tubing requirements, and they are made of the same material as your WELDCO tubing.

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mounts for hand or press use made by Pannier Brothers Stamp Co., Pittsburgh. The following also manufacture inks for sheet-metal and other purposes: California Ink Co., San Francisco; Marsh Stencil Machine Co., Belleville, Ill.; Garvey Fountain Brush & Ink Co., St. Louis; William A. Force & Co., Brooklyn, N. Y.; American Rubber Stamp Co., St. Louis; Dykem Co., St. Louis; Superior Type Co., Chicago; and International Printing Ink Division of Interchemical Corp., New York.

Traction Tester Suited to Production Lines

Due to its method of construction and operation, a traction testing instrument, made by W. C. Dillon & Co. Inc., 5410 West Harrison, Chicago 44, may be used in laboratories and on production lines where conventional testing methods are not practical. It can be suspended in any position, weighs only a few pounds, and is not injured by accidental overload. It is compact, and fits into many mechanical setups and lends itself to use in new testing facilities. Weight is 8 pounds, 4 ounces, and size is 8¼ x 6¼ x 3 inches.

This instrument is used for making tensile tests on the supporting structure of pilot seats by mounting the seat to the floor and suspending a block and tackle from an overhead support. It may be placed in series with seat and block, and, as pressure is applied, magnesium supports rupture, giving an accurate test in direct pounds load.

It may be used for friction tests on hydraulic piston packings by inserting it between the loading mechanism and the piston so that, as pressure is applied, the friction of the packing against the side wall of the cylinder may be accurately determined.

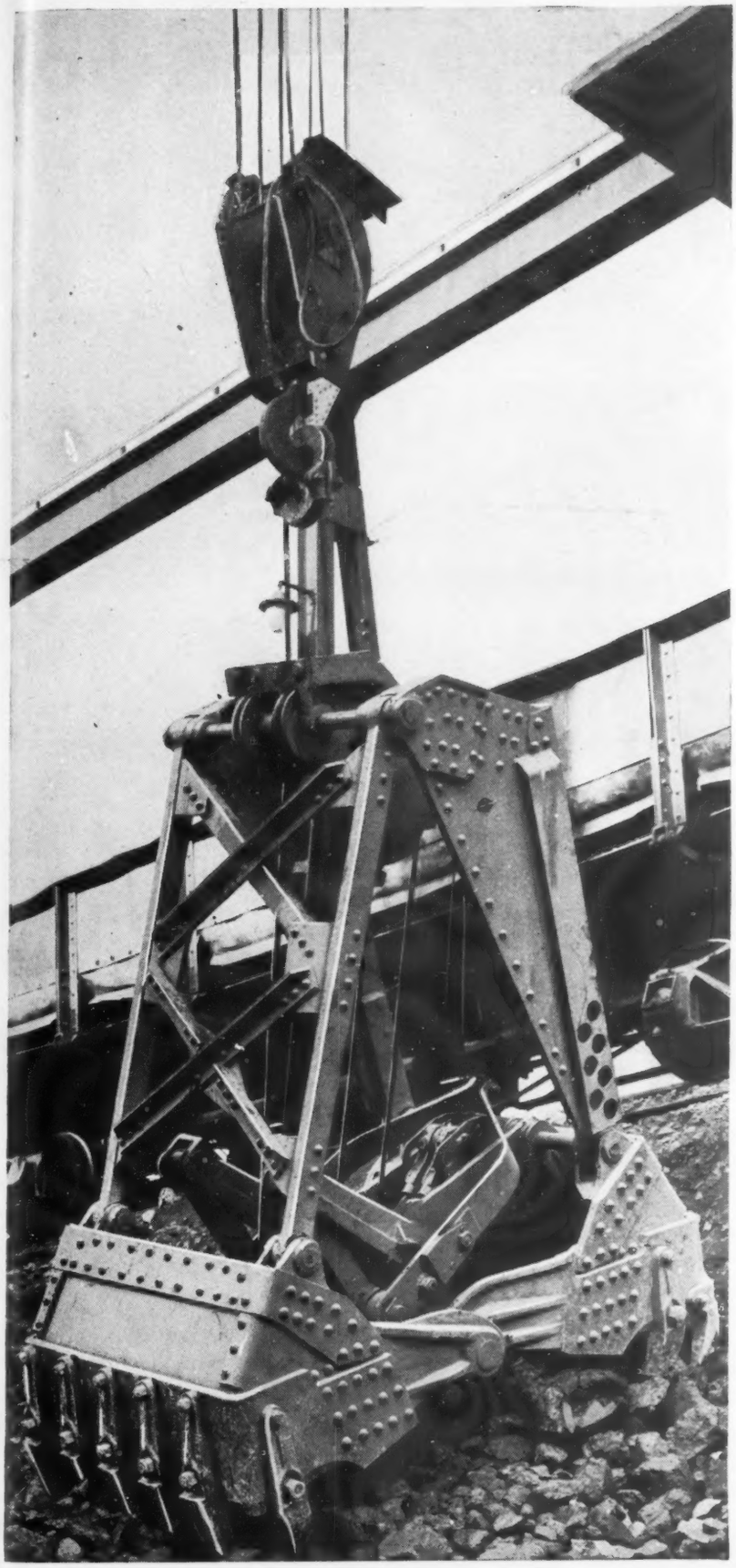
This instrument may also be used in the steel industry as a portable and accurate scale, requiring less time to connect, operate and read than the large crane-type unit. Small bundles and odd lots of steel may be weighed, saving crane scale operator expense and time required to handle larger and more costly units.

Illustrated Literature on Welding, Cutting Offered

Slide films and accompanying instructive literature on oxyacetylene welding and cutting operations and adaptable to war or peacetime production, for beginners as well as more experienced help, is offered by Linde Air Products Co., 30 East Forty-second street, New York.

Lessons are arranged in series as follows: Cutting—a series of eight lessons on connecting, testing, and lighting the oxyacetylene cutting blowpipe, and on making straight-line cuts; Welding—a series of 10 lessons showing how to connect, test, and light an oxyacetylene welding blowpipe, and giving basic instruction for welding light plate; Safety—a series consisting of one lesson on care and handling of equipment and a second lesson on fire precautions.

Each film comes with three instructor's handbooks and 25 student handbooks, containing a record of the procedures shown in the film.



IT'S THE PRINCIPLE OF THE THING

Preference for Blaw-Knox Single Line Buckets is due largely to the operating and structural advantages of the *exclusive* folding arm principle of engagement and disengagement.

1. Safety from the hazards of hand injuries
2. Absolute insurance against accidental dumping when the Safety Hub Trip is employed
3. Automatic Dumping

The Blaw-Knox complete line assures top performance under the conditions covering any specific application.

★

Blaw-Knox Size No. 3201 (rated 2 Cu. Yds.) Single Line Hook-on type bucket handling open hearth limestone to charging boxes . . . For complete data write for catalog No. 2002.

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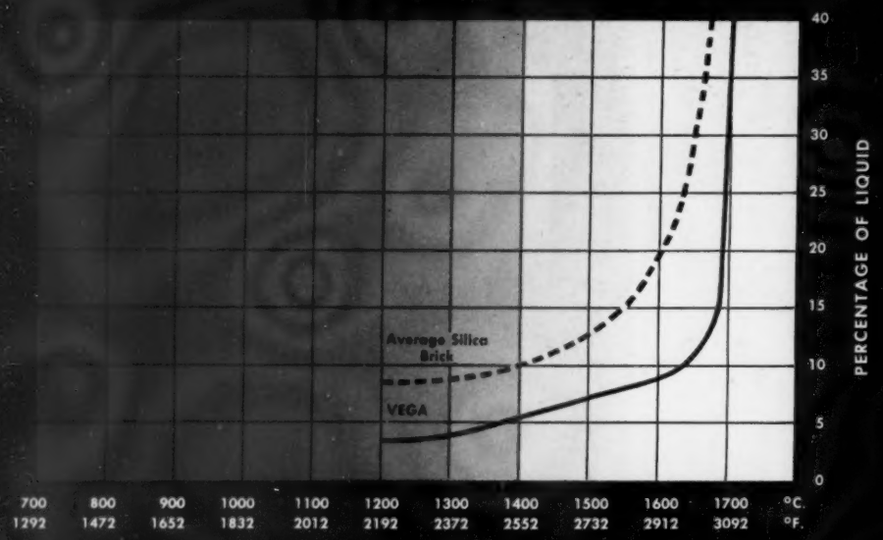
BLAW-KNOX CLAMSHELL BUCKETS



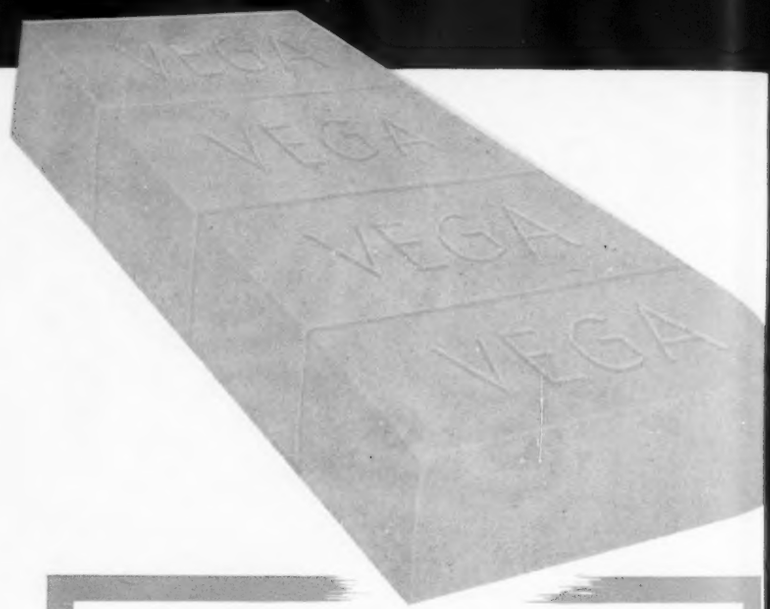
3.01

MELTING BEHAVIOR CHART BASED UPON HARBISON-WALKER RESEARCH AND PUBLISHED DATA

Note the melting behavior of a silica refractory with a total of 1.2% alumina, titania and alkalies, and 2% of lime. This silica brick — a fair average of commercially available silica refractories—becomes 10% liquid at 2550° F. (See broken line on chart.)

Contrast the melting behavior of VEGA Super-Duty Silica Brick, a refractory containing a total of only 0.4% alumina, titania and alkalies, and 2% of lime. Note that VEGA does not become 10% liquid until a temperature of 2970° F. is reached . . . more than 400° F. higher. (See solid line on chart.)

Note, too, that VEGA does not develop 30% liquid until a temperature of 3090° F. is reached, while the average silica brick reaches this stage of melting at 2990° F., a full one hundred degrees lower. These temperatures correspond closely to the maximum temperatures at which the brick will sustain heavy loads.



Important Notice!

LICENSING ARRANGEMENT

A definite contribution to longer furnace life and greater steel production, VEGA brick should be made available as soon as possible to the largest number of steel producers.

Harbison-Walker will, therefore, license other responsible producers of silica refractories to manufacture brick under the VEGA patents.

Super-duty silica refractories, made under the VEGA patents by other manufacturers, will carry this identifying symbol of plus quality + following the manufacturer's established brand name.

HARBISON-WALKER REFRACTORIES CO.

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World's Largest Producer of Refractories

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lb. per ton against 3.90

VEGA

SUPER-DUTY SILICA BRICK

shows saving of 23% in refractories

Here are some interesting facts and figures on a seventeen-months' operating test of Vega Super-Duty Silica Brick in 19 furnace roofs at a well-known open hearth plant:

The roof of each furnace was divided from the front to the taphole . . . one half of the roof was laid with high quality silica brick . . . the other half with Vega Super-Duty Silica Brick.

Examination of the first six furnaces to come down showed that Vega Super-Duty Silica Brick sections did not have to be repaired through 184 heats . . . the other sections required repairs at 133 heats.

Consumption of the silica brick regularly used in these furnace roofs was 3.90 pounds per ton of steel . . . consumption of Vega Super-Duty Silica Brick was 3.01 pounds per ton — a saving of 23%.

Vega, *the first commercially available super-duty silica brick,* was developed by Harbison-Walker research to meet the demand for a silica refractory that would permit higher furnace temperatures, give longer life and reduce maintenance costs. Write for further data.

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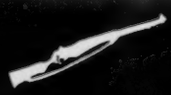

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Forging Practice

(*Continued from Page* 104)

a solid pitman connected directly to the overarm type ram. This results in almost complete elimination of "spring" and extremely accurate die alignment.

Speed is next in importance in press operation. It not only affects output, but also die life. In rapid production, there is a constant flow of heated metal being fed into the dies, and consequently the shortest time the metal is in contact with the dies will result in the least heat transmitted and, therefore, the least tendency to draw the temper of the die steel prematurely. In this connection, the rapidly revolving flywheel and fast reciprocating ram are important as well as the rugged knockout whose action is quick and positive. By synchronizing the knockout with the ram, the hot forging is lifted out of contact with the die the instant that the ram begins its upstroke, thereby preventing excessive heat transfer from the forging to the die.

This type of press is very adaptable for the finishing or coining operation used on blanks previously prepared on hammer or forging machine. Coining is performed at temperatures below the scaling point of the metal, resulting in close tolerances and good finishes. It is not advisable to use this equipment for drawing and preliminary operations which may be handled more efficiently on a hammer where the strength of the blow may be controlled. While comparatively simple forgings of symmetrical contours are adaptable to the press, the forging machine with its split die is more suitable for forgings with projecting parts which could not be easily removed by use of the knockout on the press.

One such press of 200-ton capacity is in operation at the Lynn River Works. A hot forming operation is done on 10-inch diameter bearing shells made from low carbon steel. These are made from plate stock bent on the press into a semi-cylinder ready for finish machining. They are eventually to be finish forged on a 2000-ton steam hydraulic press in the Lynn River Works.

Thirty-two trimming presses are used at Lynn River Works in conjunction with the drop hammers. They are of similar construction to those described above and range in size from 22½ to 192 tons. Here again, accurate die alignment is very important as the flash must be trimmed evenly around the edge of the forging. The operation is similar to punching in that the trimmed forging is pushed through the trimming die by means of a punch attached to the ram leaving the flash or trimming in the form of a ring on the trimming die.

Heat Treatment—General

The majority of ferrous forgings are given one or a combination of the following heat treatments: anneal; normalize or normalize and temper, quench and temper; stress relief anneal. A brief description of each treatment and its purpose follows:

Annealing consists of heating steel to

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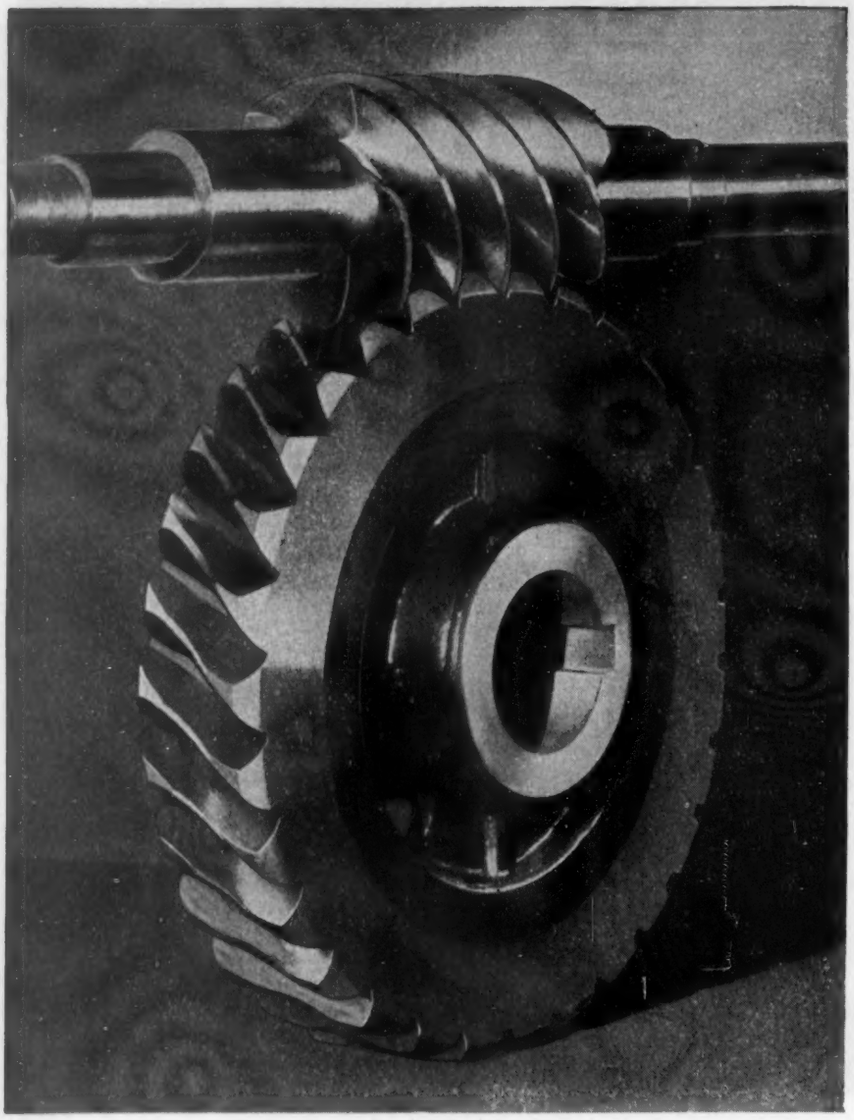

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1. Glass hard worm surfaces.
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4. Gear hobs ground exactly to the contour of worm.
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above the critical, equalizing the temperature, and slow cooling in the furnace. The purpose is to remove all the forging stresses and render the material in its softest state, usually for machining operations. (However, it is to be noted the maximum machinability often may not be obtained in the annealed state, depending chiefly on the composition of the steel and the type of machining operation performed.)

Normalizing or normalizing and tempering. Heating to above the critical, equalizing the temperature, and air cooling is called normalizing. A fine pearlitic structure is produced. The purpose is removal of stresses and grain refinement. The hardness obtained is somewhat higher than in the annealed state, but can be "drawn back" to approximate the annealed hardness by tempering at various temperatures, usually 600-650 degrees Cent. (1100-1200 degrees Fahr.).

Quenching and tempering consists of homogenizing the steel above the critical, quenching rapidly into some media, such as water, oil, or air, to produce a martensitic structure followed by tempering to the desired hardness and physical properties by reheating and holding at some subcritical temperature.

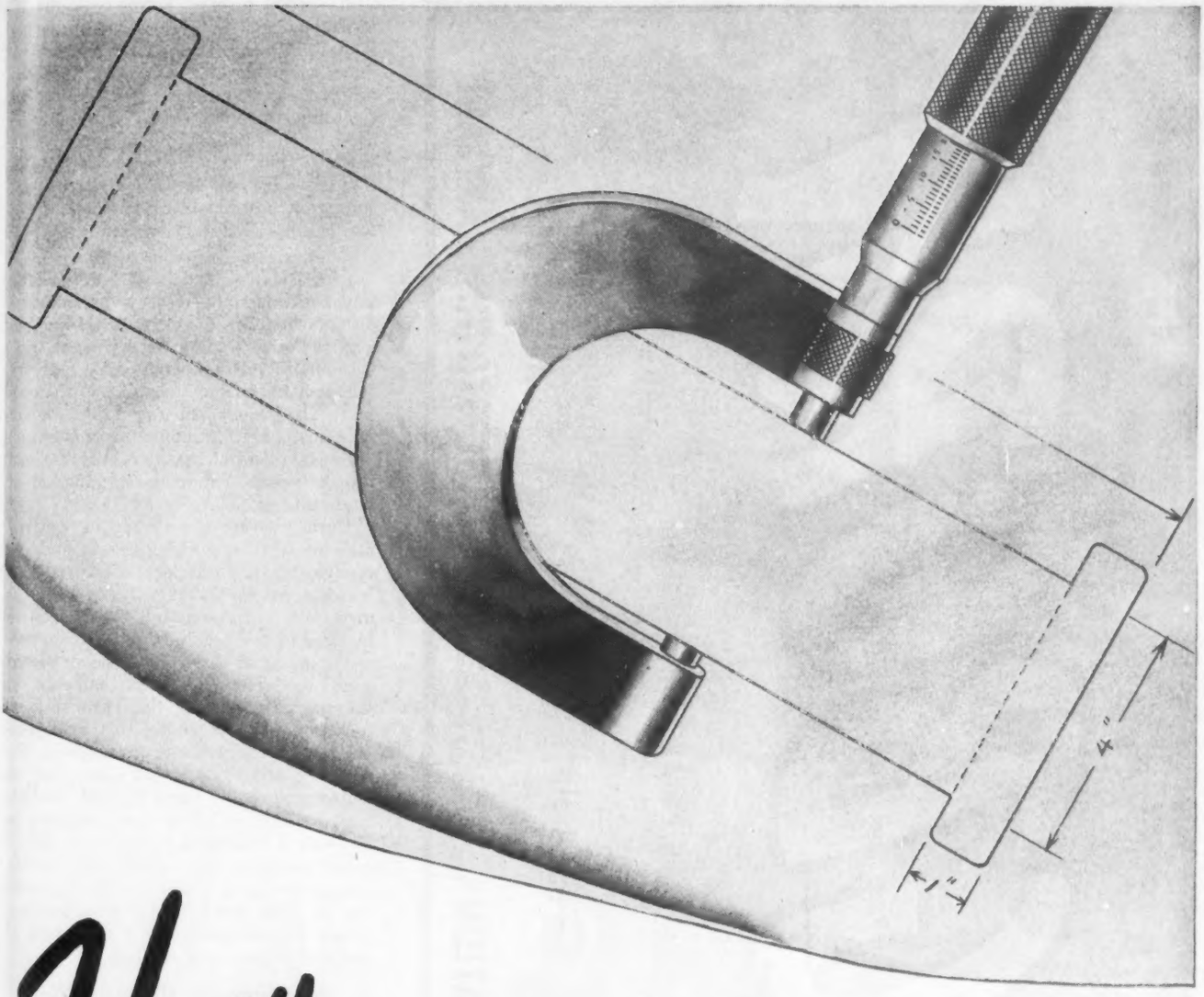
Stress relief annealing is the drawing at some subcritical temperature to relieve residual stresses which may have been induced by cold working or temperature gradients, using a controlled rate of heating and cooling. The rate of heating and cooling will depend upon the size and shape of the forging, and should be controlled in such a manner as to maintain a minimum temperature differential throughout the material. When stress relief annealing quenched and tempered parts, a temperature of 25 degrees Cent. (50 degrees Fahr.) below the tempering temperature should be used so as not to destroy the physical properties already obtained by heat treatment. Proper stress relief annealing promotes stability of dimensions during machining operations, since no residual stresses are present to cause distortion or warping.

Many forgings are case hardened by carburizing, nitriding, induction hardening, flame hardening, etc.

New Developments in Heat Treatment

Two relatively new methods of heat treatment which have great potentialities and are destined to become of importance in the heat treatment of small forgings in the future are isothermal transformation treatments and martempering. These may be described as follows:

(a) **Austempering (isothermal transformation treatments)** consists of quenching steel into a molten salt or lead bath maintained at some constant, subcritical temperature, and holding at that temperature until the austenite transforms completely into its reaction product (bainite or pearlite). The bainite structure obtained somewhat resembles that of tempered martensite, such as occur on quenching to room temperature and tempering at approximately 200 degrees



How to cut production costs with FORGINGS by PHOENIX

Less machining: Drop-forged parts are formed in precision-made dies. The heated metal is forced into every part of the die, yet is limited to its exact size and shape. Therefore, drop-forgings can be held to quite close tolerances, leaving very little excess metal to be removed. Machining time is reduced to a minimum—costly man-and-machine hours are saved.

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Cent. (400 degrees Fahr.) or above.

The advantage of isothermal treating is that in certain hardness ranges, it produces a tougher and more ductible product than can be obtained by conventional quenching and tempering. It should be used where (1) high ductility plus high hardness are desirable, and (2) the introduction of high quenching stresses, resulting in possible distortion and cracking, is objectionable.

(b) **Martempering** consists of quenching from above the critical into a liquid salt bath maintained at a temperature just above that at which martensite begins to form, holding for sufficient time to equalize the temperature throughout, followed by cooling in air, and tempering. This results in the formation of martensite with a minimum of residual stresses, in contradistinction to isothermal transformation, where the production of martensite is definitely avoided.

During severe quenching of a large mass of steel, quenching cracks and excessive residual stresses are produced because of (1) increase in volume as martensite is formed, and (2) differences in rates of contraction due to a temperature gradient. This is to be expected since the interior portions or core of the part cool slower than the surface. Martempering overcomes this by equalizing the temperature throughout the part of a temperature, just above that at which martensite forms (called the M_s temperature), and then slowly cooling in air with a minimum temperature differential between the surface and center. Martempering is useful in the quenching of large and irregular cross sections where full hardness and a minimum of residual stresses are desired.

Heat Treatment of Forgings for General Use

Although some forgings are used in the annealed or normalized condition, the majority of forgings are given the following heat treatment to develop maximum physical properties:

(a) **Normalize** — The grain size and structure of forgings are generally non-homogeneous because (1) the amount of work on different sections of the forging is generally not uniform, and (2) temperature differences exist between the surface and center. For this reason, normalizing is generally recommended as a preliminary treatment for all forgings to produce a more homogeneous structure, as well as to remove forging stresses.

(b) **Quench** — Forgings are generally quenched in oil, water or molten salt. Plain carbon or low alloy steels with approximately 0.35 carbon or less may be quenched in water without danger of cracking, while steels with higher carbon and/or more alloying elements are generally oil quenched. The use of molten salts as a quenching medium is rapidly coming into greater prominence.

(c) **Temper**—The purpose of tempering is (1) the removal of quenching stresses, (2) the reduction of hardness for

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machinability, and (3) obtaining the desired physical properties. It has been found that certain low alloy steels such as nickel-chrome-molybdenum and nickel-chrome-molybdenum-vanadium have better machinabiity in the normalized and tempered condition than in the annealed state. Since the hardnesses are relatively the same, the difference in machinability is due to the difference in microstructure which is to be expected, since the normalized and tempered material has a lesser amount of free or proeutectoid ferrite present.

As stated above, maximum machinability may not be obtained with minimum hardness. It has been found that maximum machinability is obtained during certain milling, broaching, and drilling operations on quenched and tempered materials having a hardness of approximately 250 brinell (rockwell C 24). A range of 250-283 brinell (rockwell C 24-30) appears to be most satisfactory for the cutting of gear teeth.

Heat Treatment of Forgings Requiring Close Finish Machined Tolerances

For forgings which are to be machined to extremely close tolerances, the following heat treatments are recommended:

Treatment I

(a) Normalize and temper, or
(b) Anneal using slow furnace cool
(c) Machine to approximately $\frac{1}{32}$ to $\frac{1}{16}$" over finish dimensions
(d) Quench
(e) Temper
(f) Finish machine

Treatment II

(a) Normalize
(b) Quench
(c) Temper
(d) Semifinish machine to approximately $\frac{1}{32}$ to $\frac{1}{16}$" over finish dimensions
(e) Stress relief anneal at 25 C below tempering temperature
(f) Finish machine

Treatment I is recommended in cases where a large amount of material is to be rough machined off the forging.

Treatment II is recommended for forgings requiring extremely close finish dimensions. In any instances where stresses may be introduced into the material by machining itself, stress relief annealing treatments should be interjected between various stages of the semifinish to finish machining operations.

Acceptance Tests

Each forging used in the General Electric Co. is given one or more of the following acceptance tests to insure quality before it is released into production.

(a) **Chemical analyses** are generally made on the bars or billets before forging, and checked against the analysis as prescribed by the specification. Material for the analysis is usually taken midway before the surface and center, in order to obtain an average sample where segregation may exist.

(b) **Physical or Mechanical Tests.**

(1) **Tensile Tests** are conducted to obtain knowledge of the strength and ductility of a material. Since the forging

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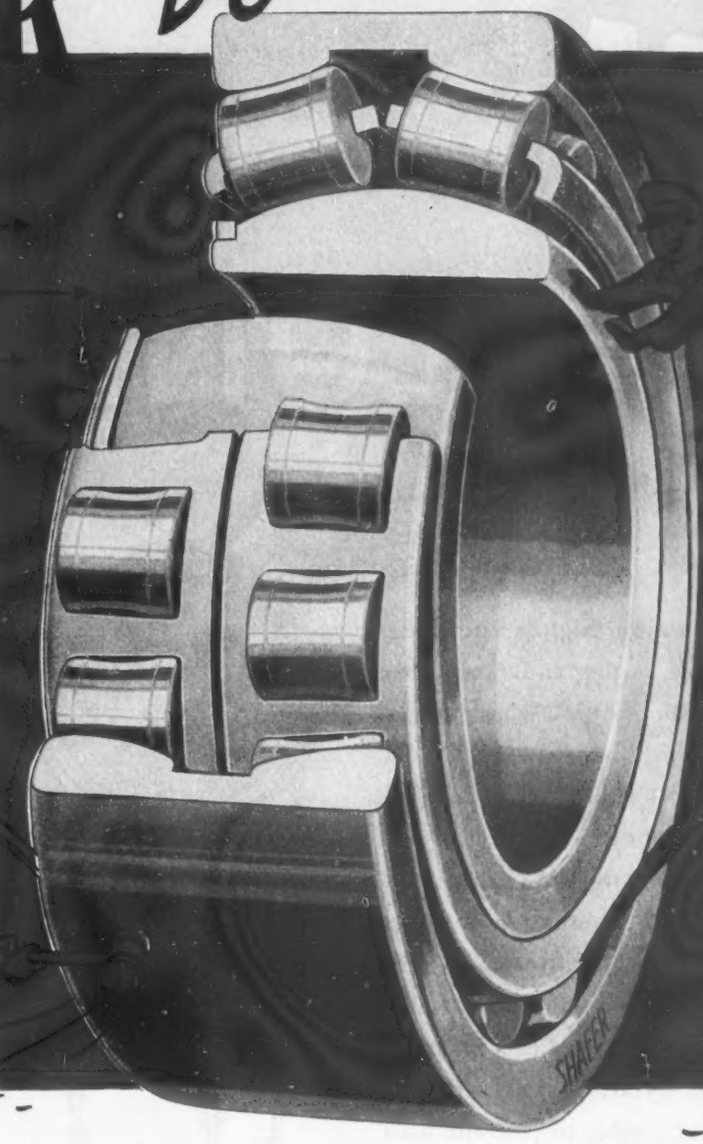
under heaviest loads and adverse operating conditions



Any experienced engineer recognizes that *most* bearing installations *must* encounter shaft misalignment and deflection . . . end and radial thrust and even heavy shock loads. And more and more engineers are recognizing that only Shafer ConCaVex Bearings have the design and construction that keep them free-rolling, self-aligning and self-centering under *all* such conditions at *all* times. For only Shafer Bearings combine the ball bearing and roller bearing construction . . . only Shafer Bearings combine the low rolling friction of a ball and the high load capacity of a roller. Only Shafer Bearings have such an outstanding record of service on the *tough* installations for the past 25 years. Ask the men who KNOW. SHAFER BEARING CORPORATION, 1418 West Washington Blvd., Chicago 7, Illinois.

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Shafer ConCaVex Self-Aligning Bearings combine the advantages of both ball *and* roller bearings. A Shafer Bearing utilizes the effective contact area of a ball many times its size . . . providing automatic end-thrust absorption, superior shock resistance and long life.

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One outer race, one row of rollers, one inner race. Self-aligning with radial and thrust load capacity.

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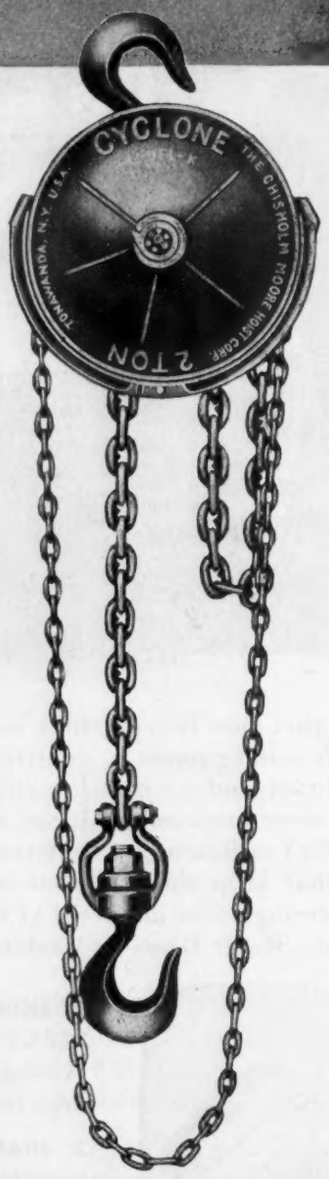

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fiber affects certain physical properties, it is important that the location of the test coupon in the forging be known. Although there is little or no difference in the tensile strength and yield strength of specimens cut parallel and perpendicular to the forging fiber, the ductility values differ greatly. For this reason, test coupons are generally removed directly from forgings, and the use of separate test coupons (cut from bar stock or subjected to a different degree of forging) is permitted only in certain instances. These tensile tests may be conducted at elevated temperatures as well to gain information as to the short-time strength of the material at high temperatures.

(2) **Impact Tests** consist of fracturing notched specimens by means of a pendulum, and obtaining therefrom the amount of energy (in foot pounds) absorbed by this work. The impact strength indicates the toughness of the material. Here again, the position of the forging fiber in the specimen is very important, since the impact strength of a longitudinal specimen is approximately three times greater than that of one cut perpendicular to the fiber.

(3) **Hardness Tests.** Forgings are tested for hardness on both the brinell and rockwell machines. In the forge shop, the brinell testing method is more reliable and popular, since it does not require as much care in preparation of the surface and positioning of the forging in the machine to obtain reliable results.

(4) **Bend Tests** are used as a severe test of ductility, and are an indication of the behavior of the material under a static bending moment. Specimens from annealed carbon steel forgings are usually required to bend 180 degrees around a specified radius. Once again, the position of the forging fiber is important, with the longitudinal specimen withstanding a greater degree of bend than the transverse specimen.

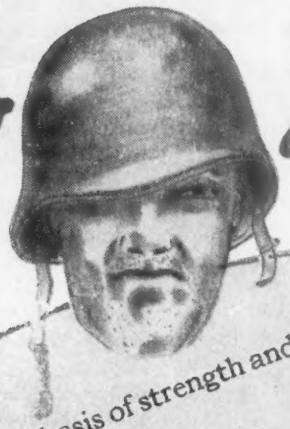
(5) **Fatigue Tests** are conducted to test the life or endurance of the material under cyclic, alternating stresses applied rapidly. The transverse fatigue strength is approximately 15 per cent lower than the longitudinal fatigue strength for ferrous forgings in general.

(c) **Corrosion Tests.**

(1) **Salt Spray and Steam Tests.** Corrosion specimens are subjected to various media, and the rates of corrosion of various materials are obtained. The chemical composition and surface finish are the main factors in corrosion resistance.

(2) **Strauss Test** is a rapid means of checking the susceptibility of stainless steels to corrosive attack. It consists of soaking specimens for 72 hours in a solution of boiling cupric sulphate plus sulfuric acid solution, followed by a 90-degree bend test. It weakens unstabilized 18-8 stainless steels which show chromium carbide precipitation, and thus serves as a simple device for de-

WHY ARE FORGINGS *So Tough?*



1. What is the basis of strength and toughness in forgings?
2. Although actual grain structure of the metal can be controlled by heat treatment, does subsequent heat treatment change the fibre-like structure of the forging?
3. How does correct forging technique develop maximum strength and toughness in forgings?
4. What, in forging practice, is known as "refining"?
5. Where are the strength producing effects of the forging process in closed impression dies most apparent?
6. What can we do to help you improve your forging practice and your product?

1 a. The flow lines or fibre-like structure inherent in the steel (directioned by hot working (i.e. forging) increases the desirable properties for the finished product.

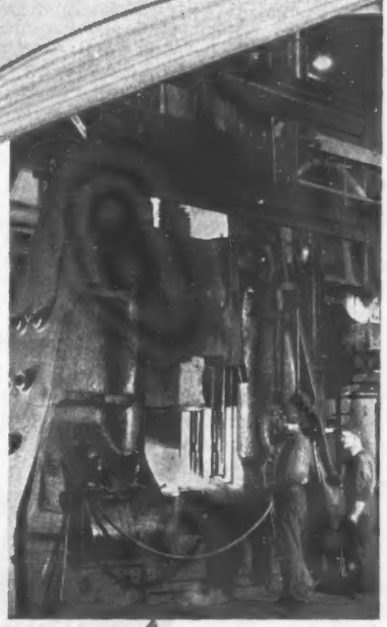
2 a. No, the fibre-like structure of the forging is retained regardless of subsequent heat treatment.

3 a. Correct forging technique positions the steel in the first forging operation so as to utilize flow lines or fibre-like strength and toughness in manner that will develop maximum strength and toughness in those portions of the forging where it is most necessary.

4 a. The elongation of metallic crystals or grains and breaking up of large crystals by forging in closed impression dies produces a finer grain structure in the metal. This is usually referred to as "refining."

5 a. Where the stresses in application of finished forgings to machines prove to be the highest, these forgings best demonstrate their tough, strong qualities.

6 a. Consult with us.



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DESCRIPTION AND USE. A high grade heat-resistant alloy possessing superior properties in certain high temperature applications where corrosion is also a factor. Its high Nickel content also increases its resistance to carbon absorption. This alloy has proved particularly economical in long cycle applications.
TYPICAL USES: Carburizing containers, retorts, furnace parts and fixtures, salt pots.

② **MICHIANA Zorite. 35% Nickel, 15% Chromium.**
DESCRIPTION AND USE. High strength at elevated temperatures. Is the most universally used grade in the field of heat treatment. Along with other high Nickel alloys, it is not recommended for use in the presence of sulphurous atmospheres; but under practically all other conditions, this grade shows remarkable durability and therefore economy.
TYPICAL USES: Furnace parts such as rails, beams, supports, rollers. Also carburizing containers, annealing boxes, salt pots, retorts, trays, fixtures, magnesium retorts, etc.

③ **MICHIANA No. 100. 25% Chromium, 12% Nickel.**
DESCRIPTION AND USE: This alloy has superior qualities under certain high temperature corrosion conditions particularly where sulphurous gases are present. It is only slightly inferior to Zorite from standpoint of strength at high temperature. Because of its greater affinity for carbon it is not recommended for use in a carburizing atmosphere nor in contact with carbon.
TYPICAL USES: Much the same as indicated for Zorite with the exception above mentioned. Also as indicated it would be preferred in the presence of a sulphurous atmosphere.

④ **MICHIANA No. 48. 28% Chromium, 8% Nickel.**
Similar to No. 100, having somewhat higher resistance to sulphurous atmospheres at high temperature. This composition does not fall within the stable Austenite formula however.

⑤ **MICHIANA No. 55. 33% Chromium, 3% Nickel.**
There are a few heat-resistant applications where a high Nickel content is detrimental. An example of this would be where Copper, which has a high affinity for Nickel, comes into contact with such an alloy at high temperatures more particularly above 1600° F. Also in some cases, detrimental catalytic action has resulted from a high Nickel content.
In these instances, the above alloy would be specific, but it will be understood that in all cases, the maximum permissible Nickel would be used to minimize other detrimental effects of low Nickel.

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tecting improper heat treatment of 18-8 austenitic steels.

(d) **Visual Tests.**

(1) **Macroetch Tests.** Sections for etch tests are often removed from forgings, or forging billets, surface ground, etched in a hot acid solution, and then examined at low magnification (1-10 diameter) for the following defects:

(a) Forging and fiber and dendritic structure.

(b) Physical discontinuities, such as surface seams, forging folds, thermal cracks, pipe, forging tears, porosity, flakes, etc.

(c) Chemical inhomogeneity, such as segregation of alloying elements, inclusions, etc.

(2) **Sulphur Printing.** A permanent record of the distribution of sulphur in the material can be obtained by sulphur printing. This method consists of applying the emulsion side of sensitized photographic paper which had been soaked in a 2 per cent sulphuric acid solution to the area in question, rinsing the paper, and fixing in hypo. The sulphur in the material reacts with the silver bromide on the paper to form a brown pattern. The darker and heavier the pattern, the more sulphur is indicated to be present.

(3) **Microexamination.** Examination under the microscope at a magnification of 10 diameters and upward is for determination of grain size, amount of decarburization, or carburization, homogeneity and type of structure, dirt or inclusion rating, identification of defects, such as thermal cracks and inclusions, measuring size of discontinuities, burning, and for many other purposes.

(4) **Visual Inspection** for relatively large cracks and tears which can be seen at 1-2 diameters magnification upon close examination.

(5) **Magnetic Particle Testing** is a nondestructive means of detecting surface and to a limited extent subsurface defects in ferromagnetic material by magnetizing the material in the proper manner to produce small external, leakage fields over the defect at the surface. These leakage fields attract and hold over the defect extremely fine magnetic particles applied on the surface either by the wet method (particles suspended in light oil) or the dry method (use of dry powder). By this method, defects such as laps, thermal cracks, seams, inclusions, and cold shuts can be discovered.

(6) **Magnaglo Testing** is a variation of magnetic particle testing. Tests are made with the same procedure, but the wet particles are coated with a fluorescent material. Inspection is made in a dark room using a near-ultraviolet light source, which causes defective areas to fluoresce or glow in the dark, thus giving a light ratio of about 100 to 1 from a fluorescent defect to dark background. This advantage makes it valuable for inspecting the material in which defects might be extremely small and difficult to see after an ordinary mag-

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netic particle test inspection in daylight or white light.

(7) **Zyglo Testing** is a nondestructive test for detecting defects in nonmagnetic material. It is a modern version of the "kerosene and whiting" test. The material is immersed or saturated with a penetrating oil to which has been added a fluorescent dye. Capillary action draws the penetrant into any cracks or voids in the surface. Excess penetrant which contains an emulsifier is washed off with hot water. Surfaces are dried and an absorbent powder is applied which draws oil from the defects. The latter fluoresces or glows under the near-ultraviolet light, as in the magnaglo test.

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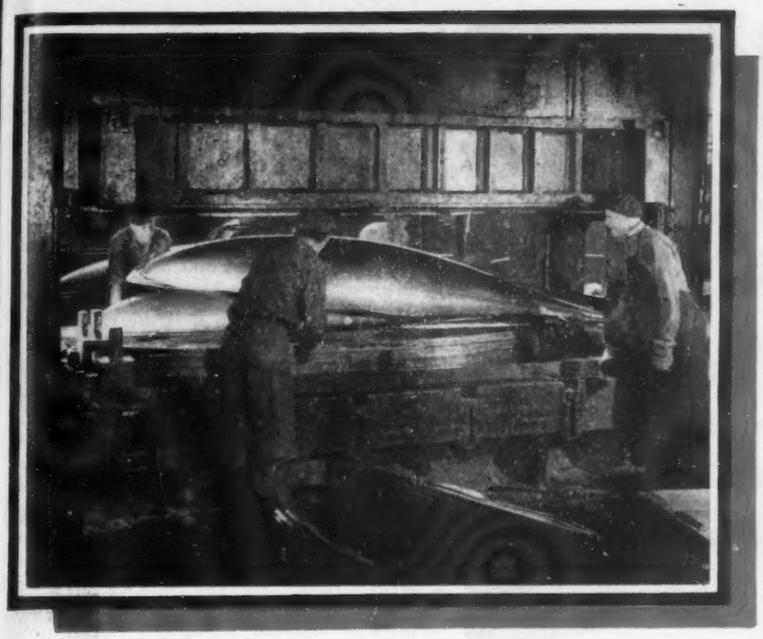
Aluminum Dipper Handles Heavy Loads

A 32-cubic yard aluminum shovel dipper, built by Marion Steam Shovel Co. and owned by Northern Illinois Coal Corp., is used in the coal fields near Wilmington, Ill., to strip the overburden from veins of coal. Since it was built 9 years ago, this dipper has moved 54,000,000 cubic yards of earth, equivalent to 90,000,000 tons. It is used along with three smaller aluminum dippers, and the four dippers have, over the past ten years, moved enough material which, if put into trains, would make 31,857 train loads, each train about one mile long.

Midland Electric Coal Corp., Farmington, Ill., has six aluminum shovel dippers in service, some for as long as ten years. They range in size from 4 to 22 cubic yards and have moved more than 82,000,000 cubic yards of material. Aluminum dippers for stripping are expected to be widely used.



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THAT is an old story at Mullins where it so often has been proved untrue. It was heard years ago about automobile bodies and fenders, washing machine tubs, motor housings, and wasn't true. It was heard during the war about mortar shells, jettison tanks and bombs, and again wasn't true.

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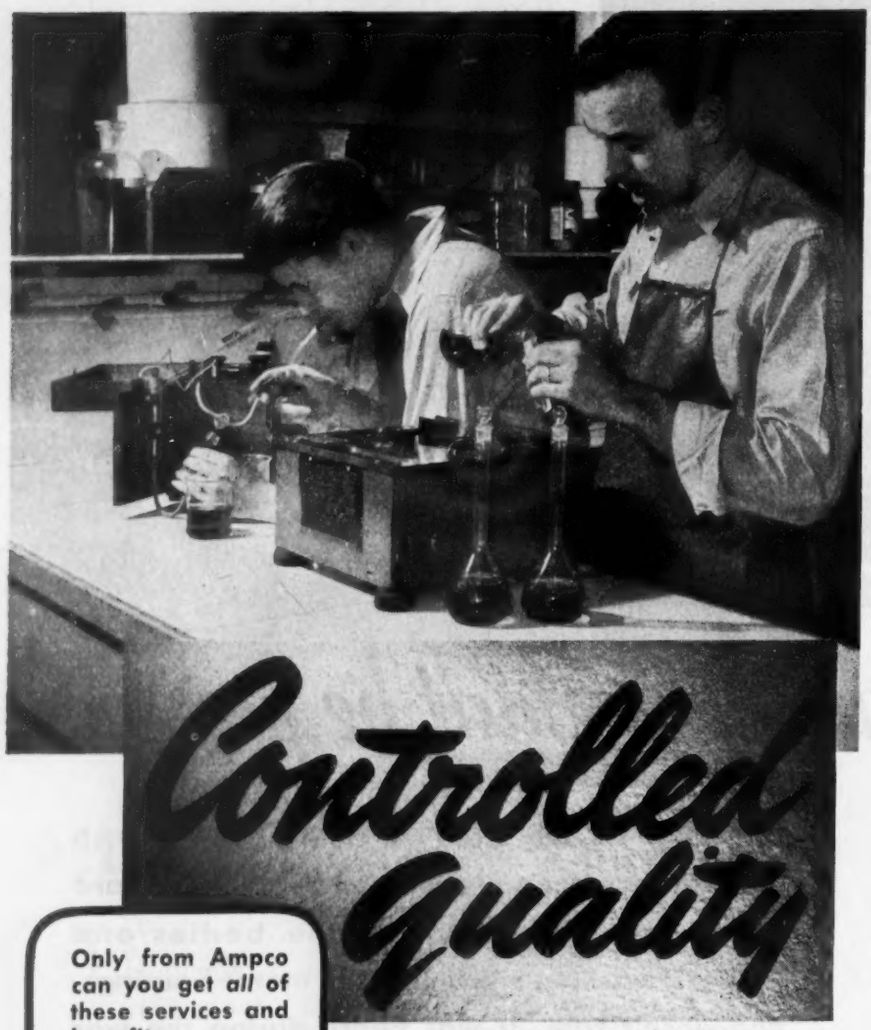

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Sludge Deposits

(*Concluded from page* 106)

ter atomization, more uniform combustion and a much more even flame at the burners. Combustion is more complete and thermal efficiency materially improved.

Soot and carbon deposits in the firebox are greatly reduced and the smoke nuisance—which is far more frequently due to sludge in the oil than to poorly adjusted oil-air balance, is brought under complete control.

While the assured temperature (and atmosphere) control made possible by sludge-free operations might be considered the most attractive advantages, it is well not to overlook the elimination of shutdowns made necessary for cleaning out of screens, valves, piping and burners, which may often cause considerable delay when sludge troubles become acute and which, in the aggregate, often have a material effect on overall production. Nor should the maintenance expenses caused by carbonization in burner orifices, a regular result of sludge, be overlooked.

One other point deserves mention. An important factor in the formation of sludge in fuel oils is the accumulation of water in the storage tank. Pitting, rusting and leaking are far from infrequent results from neglect of sludge accumulations. Dispersal of sludge also includes dispersal of the water throughout the body of the oil, so that these troubles are also ended.

Sludge deserves far more attention than it usually receives in the metal product field. It is ordinarily considered as one of those minor operating "bugs" which are a nuisance, but not of great moment. When sludge troubles become acute, they are solved as best they can, to be forgotten until they crop up again. Yet taken in the aggregate, their costs are not negligible, if only considered from the angle of maintained operation of the oil-fired equipment concerned.

If adequate cost figures could be made available on the effects of poor temperature or atmosphere control, inefficient firing and poor thermal efficiency caused by sludge, no one could possibly regard sludge as a simple nuisance.

Burr Removing Tool Adaptable to Spindle

A burr-removing tool that removes all burrs and sharp edges around the inside of holes of either single or multiwalled parts can be placed in the spindle of any machine tool. Its sharp cutting blade quickly removes the burrs.

An engraved black line around the circumference of the shaft is said to increase the efficiency, ease and speed with which each Nobur tool, made by Nobur Mfg. Co., 910 North Orange, Los Angeles, may be used. Placed around the shaft at a point indicating the center of the cutting blade, this black line is said to provide a clear marking for the position of the work piece when burring.

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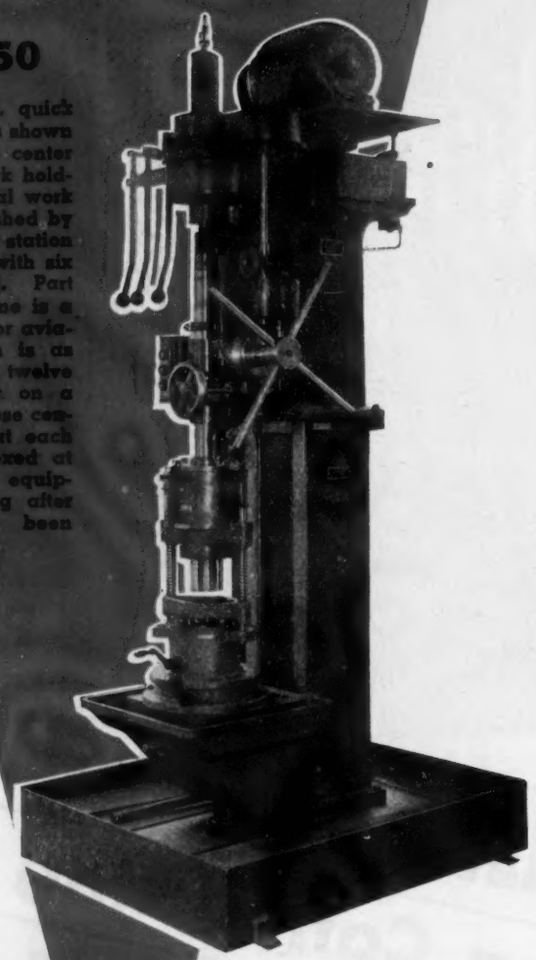

This BAKER, universal, quick change type machine is shown tooled up with a fixed center multiple head and work holding fixture. The special work holding fixture is furnished by BAKER and is of two station index type, equipped with six spindle multiple head. Part handled on this machine is a distributor drive gear for aviation motor. Operation is as follows: Multiple drill twelve holes 35/64" diameter on a 2 15/16" B.C., due to close center, six holes drilled at each cycle and fixture indexed at thirty degrees. Same equipment used for reaming after bank of parts have been drilled.

ARMY E NAVY

BAKER BROTHERS engineers are constantly on the alert to produce more modern and finer equipment needed to satisfy the demands of ever-changing industry. This Model 150, universal, quick change machine has great flexibility, not only for general purpose operations, but for high production tool jobs. Special equipment by BAKER, gives greater rigidity to the mounting of the multiple head and assures the full use of maximum spindle travel on the machine. BAKER SERVICE means complete tooling of our geared feed, heavy duty drills as well as our line of hydraulic feed machines. Write now for BAKER BULLETINS giving full technical information on these modern, up-to-the-minute machines.

BAKER BROTHERS

Incorporated

TOLEDO, OHIO, U.S.A.

Arc Furnace Linings

(*Continued from Page* 114)

A sectional steel form built up of tapered rings locked by cotter pins is preferable to the one-piece wooden type. It is more rigid and allows the lower portion of the banks to be rammed much easier. The tapping slope can be cut out of the solid bank after removing the former or a steel pipe set at the correct angle can be set in position and the bank rammed around it.

Burning-in is carried out by charging coke into the furnace and striking the arc on the lowest voltage tap and at a low current. It is advisable to use hand control throughout the burning-in period to avoid the boring of the electrodes into the soft dolomite and also minimize the danger of electrode breakage. The short circuit current carried by cold coke may be insufficient to operate return relays of the automatic control system and the electrode is carried down, boring into the bottom or breaking the electrode. As soon as the temperature inside the furnace reaches bright red heat, lump oxidizing slag is charged on to the bottom and finely ground slag dusted on to the banks. This is continued at intervals throughout the burning-in period of 48 to 72 hours. Arc furnace oxidizing slag is preferable to basic open-hearth slag as it contains less phosphorus and is therefore less likely to give phosphorus pickup when the furnace goes on steel.

Continuous Feeding Required

Continuous feeding and melting of the slag is necessary as it is soaked into the lining by capillary action and greatly assists in sintering the dolomite to a good depth. When the roof and arches have acquired a slight glaze and the banks feel hard when tested with a steel rod, the coke can be raked out. In peace time it is customary to make a scrap heat as the first charge but the present need for steel makes it necessary to abandon this wasteful practice. The first heat can be open-hearth quality plain carbon steel of medium carbon content, heavy boiling should be avoided as this might lift the bottom and the slag should be kept fairly thick to reduce any tendency to cut the immature banks.

The brickwork beneath the hearth normally does not come into contact with either steel or slag but is there as a last line of defense against breakouts. It was only natural to use magnesite or chrome magnesite bricks when these were readily available because in spite of their high cost, they were a good insurance and the recovery from used bottoms was good. During the present emergency, stabilized dolomite bricks can be used to replace these entirely and it is probable they will continue to be used after the war as they have proved reliable in practice. To improve the thermal efficiency of the furnace it is desirable to use insulating brick immediately next to the furnace shell. When the bottom becomes dangerously thin, the danger sign of a red hot patch on the shell will be masked until late by the

Help make it *easy*

Whether veterans return to jobs or unemployment, whether post-war buyers spend or hoard their hundred billion dollars now in banks and bonds, whether America's transition to a peacetime economy will be smooth or chaotic, *depends* to a large extent on what *you* do *now*.

War production must come first, but many will have died in vain if victory finds us unprepared for peace . . . Every business executive must recognize the importance of his individual part in the planned program of reconversion.

HERE'S THE IDEA . . . (1) Make an immediate analysis of your reasonable needs to begin post-war business. (2) Place unrated orders for this material to be delivered as soon as restrictions permit. (3) Advise your customers to do the same. (4) Keep up-to-date on W.P.B. and O.P.A. rulings.

HERE'S HOW IT WORKS . . . Unrated orders placed *now* permit suppliers to anticipate your needs and begin production on them as soon as the W.P.B. lifts the bars. This assures *you* of a quicker return to civilian business and customers' orders placed *with* you provide a back-log to start you off when Uncle Sam ceases to be the big buyer.

With all business following this plan America will be ready to capture and hold a gigantic world market. The money to prime the pump of business is here—17 billions of foreign dollars in gold and credits as well as our own piled up savings with which to satisfy a four-year accumulation of civilian needs. This plan will provide jobs for G. I. Joe. Your job is to work the plan.

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Your personal war effort is important (1) *Push production* (2) *Buy bonds* (3) *Plan for peace*

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Such Victory Techniques in metallurgy and in all phases of production can be vital to you in peacetime operation if a competitive position is to be achieved. *You must be alert to learn them.* And your Lindberg representative is eager to do his share to help you. Ask him about the new developments in brazing and in powder metallurgy with the new Lindberg furnaces; in the treatment of metals by heat in any form.

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insulating bricks. The installation of a base metal couple at the junction between the basic bricks and the insulating bricks would be a much better guide.

Hearth Maintenance

Once properly rammed with correctly graded dolomite and well burnt-in, the life and condition of the hearth depends largely on the skill and care of the personnel in charge of the furnace.

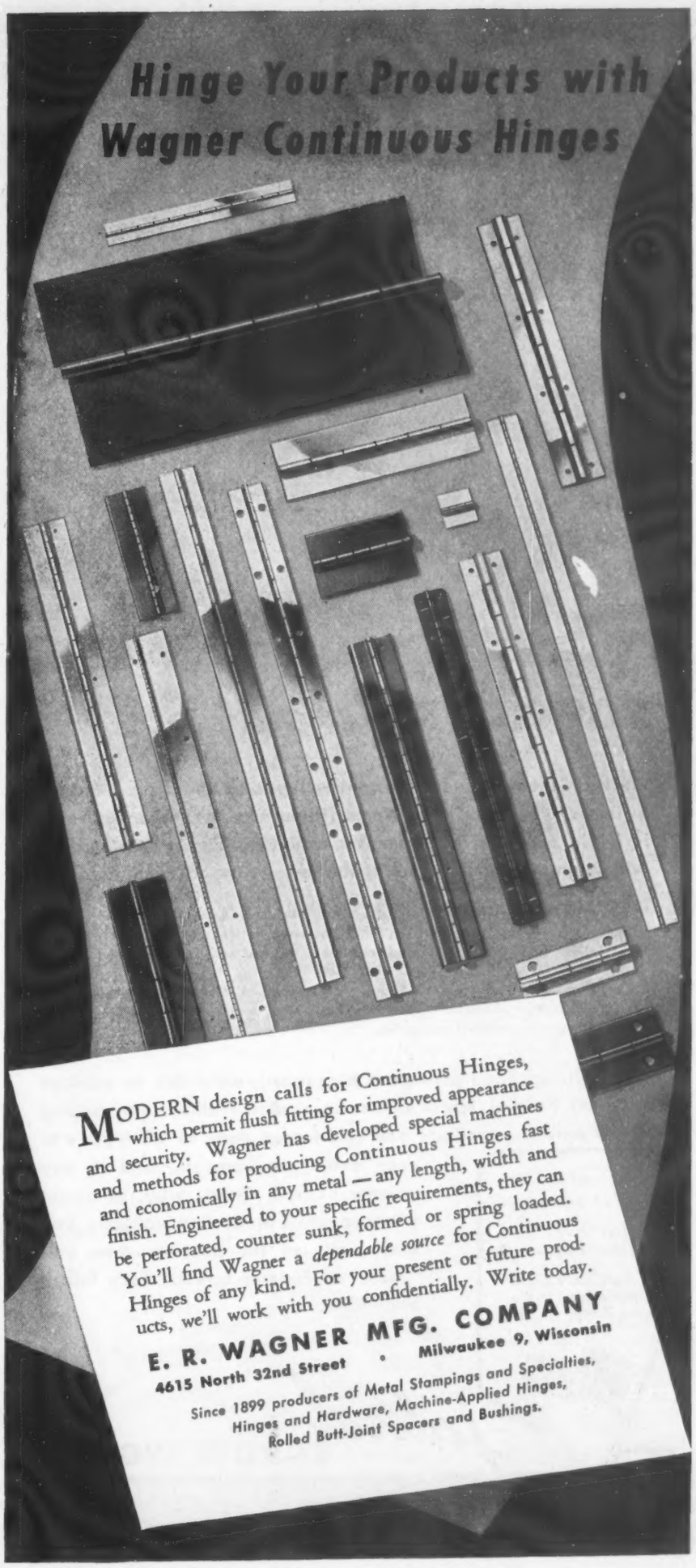
Hearth troubles can be roughly subdivided into five main categories:

1. Large shallow depressions.
2. Small deep holes.
3. Cutting of the banks at the slag line.
4. Wearing away of large areas of the banks.
5. Build up of the banks and/or bottom.

1. Shallow holes in the furnace bottom are not in themselves a serious problem. If steel is left in them, it oxidizes and the iron oxide formed acts as a flux and further wear takes place. The trouble is therefore cumulative and it is much better and easier to prevent the deepening of such shallow holes than to tackle them once they have become serious. As soon as the furnace is leveled off after tapping, the bottom is tested for holes by a long steel rod. If there is a considerable quantity of metal left, it is best to tilt the furnace to the limit in the forward direction, rapidly fettle the base of the tapping slope and then take the furnace right over again as quickly as possible in an attempt to drain the remaining metal into the tapping pit. Any metal remaining after this can be dried up with dolomite but a better plan is to set it on that part of the bottom which is not low by tilting the furnace in the appropriate direction. In this way the hole is certain to be dry whereas if it is dried in the ordinary way with dolomite and a long steel rabble, most of the metal is usually removed but some invariably remains to cause trouble at a later date.

It is always better to use tarred dolomite but if the hole is shallow and there is no hot tar readily available, it is better to use dry dolomite put on while the furnace is hot than wait until hot tar is ready and allow the temperature of the furnace to fall. A coating of fine oxidizing slag will help to frit the surface of the patch and fine lime spread on top will give added protection. As well as giving protection against abrasion by heavy scrap in the charge, the lime will react with any high iron oxide low basicity slag formed early in the melt and by increasing its basicity, lessen its powers of attack on the immature dolomite.

2. Small deep holes are usually met with on the modern high-powered furnace and are caused principally by the scrap bridging over during the melt. A pool of metal forms under the electrode and if no cold scrap falls in to chill it off, it becomes overheated and the temperature rises above the fusion point of the dolomite, resulting in the forma-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Aircraft Engine Rocker Shaft Cap: 1" hex heat-treated SAE 3135 nickel-chromium steel. Threaded, Class 3 fit. Six holes cross-drilled 60° apart. Sharp edges broken, threads burred, and piece polished and cadmium plated.

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ARMY E NAVY

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tion of a deep hole slightly larger than the diameter of the electrode. The use of high-melting voltages is usually blamed for this but it is the heavy current input that does the damage, shortening the arc and concentrating the heat on the bottom. For a given power input, a high-voltage input will give a longer arc and so heat the surrounding scrap rather than the bottom. Such a hole is difficult to dry up in the normal way on account of its depth and small cross section and it is impossible to get a long enough stroke on the rabble to splash the metal out. After filling the hole with a small amount of oxidizing slag and small lime, the higher part of the bottom should be carefully coated with sand placed precisely in position with a long shovel. In this way a channel is cut so that the metal remaining in the hole after the next tap can be pushed or pulled away. It is always a wise precaution to set the electrode nearest the damaged part of the hearth about 4 inches clear of the bottom, even though it may mean losing a little time during the next melt.

3. There is normally some erosion of the banks of the furnace at the slag line. If this is allowed to go too far, the upper portion of the bank will collapse. Repairing the slag line is not a difficult job though there is usually a tendency to use too much dolomite. The building of a bank which has collapsed is rather more difficult. If a lot of dolomite is carelessly thrown on to the thin and steep upper bank in the pious hope that it will adhere to the nearly vertical surface, the result is thickening of the lower bands where dolomite will roll down to find its own angle of rest.

A method which is a success with hand-charged furnaces and those using silica walls is as follows: the furnace is filled with scrap to the slag line and then the banks are repaired with a long shovel and the dolomite held in position by banking it up with turnings. The fault with this method is that too much dolomite is used and it has not enough time to burn properly. It often comes away into the melting slag, making the latter heavy and unmanageable. With top charged furnaces there is also a considerable delay in charging. A far better way is to repair the bank lightly after tapping and complete the work after melting the next heat by tilting the furnace slightly forward and repair the back with the electrodes up and then tilting the furnace slightly back and completing the repair of the banks with the long shovel and the arcs on. In this way the furnace is repaired at high temperature and the dolomite has a much greater chance of burning-in and any that does not stick to the bank will not thicken the bath. No time is lost as the job can be done while waiting for the analysis of the first sample and the slag at this stage is usually thin and fluid enough to take a certain amount of dolomite without thickening unduly.

4. In addition to the wear of the banks above the slag line, it occasionally happens that large areas of the bank need

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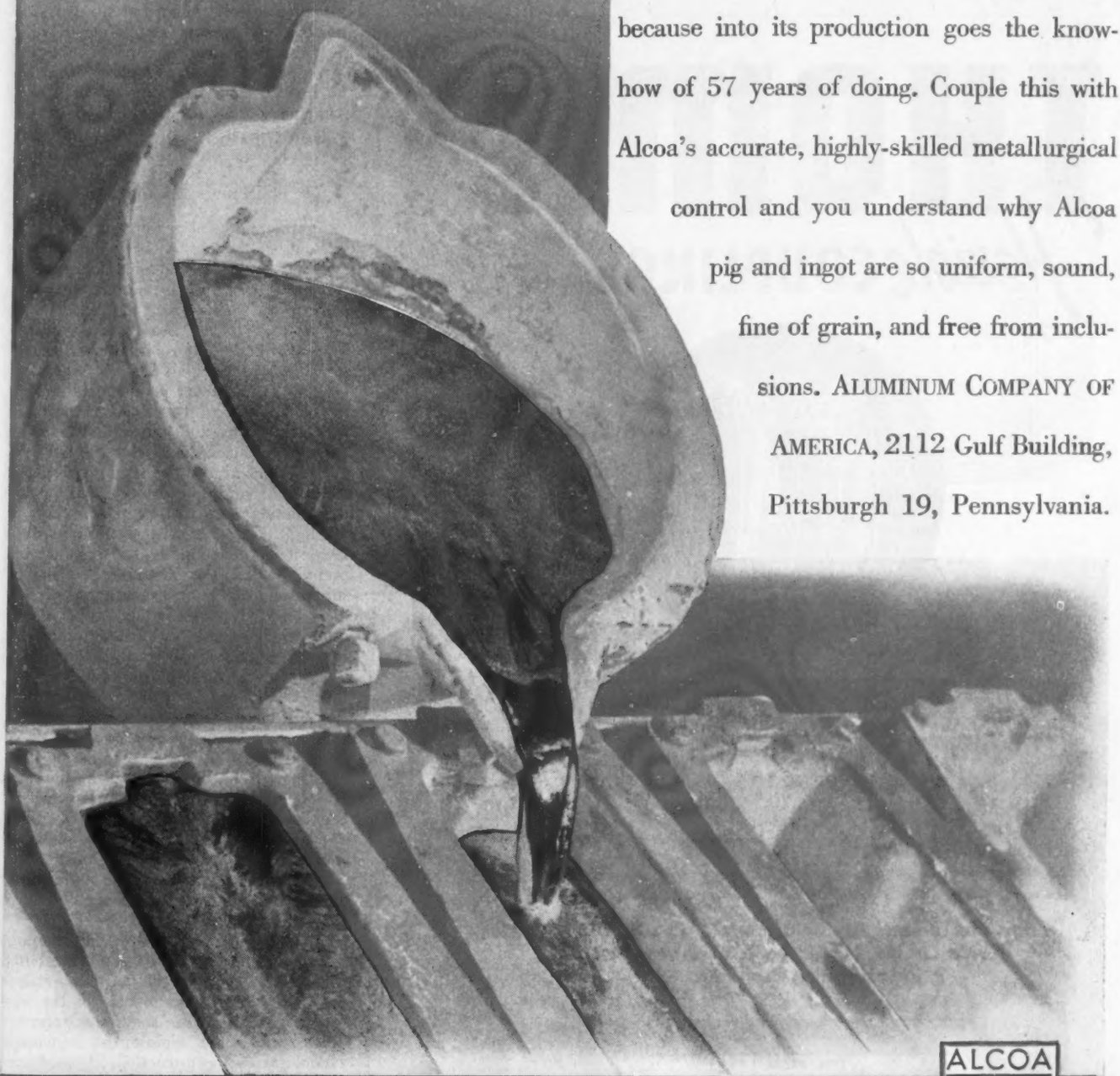
rebuilding. This is usually caused by heavy boiling, particularly if a charge has to be reboiled after the ferrosilicon addition. As with repairing any other damage to the furnace, the most prevalent fault is putting too much raw dolomite in the weak spot in the vain hope that it will burn in. When a large volume of the hearth has to be replaced, the only way to do it without wasting a lot of material and time is to spread the repair over several heats. A thin coating of tarred dolomite applied immediately after tapping while the furnace is still hot will probably fuse in successfully. In any case, if it does lift and contaminate the oxidizing slag, there will rarely be sufficient to interfere seriously with the boiling of the charge by thickening the slag to the point of complete inactivity. Application of three or four thin coverings of tarred dolomite on successive heats will normally make a good patch without hindering the working of the furnace and with minimum expenditure of time and repair material.

5. Building of the furnace bottom and banks is a trouble which, though rarely dangerous, can seriously affect the efficiency of the furnace by reducing its load-carrying capacity. The best way to avoid this trouble is careful attention to the repair work to insure that large quantities of dolomite are not carelessly thrown onto the banks only to run down to find its own angle of rest at the base of the bank. While it is good practice to protect the bottom against iron oxide attack by the slag formed early in the melt by coating the bottom with lime or limestone, this should be stopped as soon as there is evidence of growth. In any case, medium sized limestone is best as it is not fine enough to cake on the bottom readily and not large enough to give any trouble in the slag by floating about unattacked by the fluxes. There is no lack of powerful fluxing agents, the problem is to control fluxing action so that only unwanted thickness is removed.

The mildest agent is mill scale, essentially ferrous-ferric oxide and although this is not always immediately effective, it can be used without endangering the bottom. Fluorspar is rather unreliable and although early applications may appear to be ineffective, the bottom or bank will go suddenly, sometimes to a much greater degree than was intended. Silica must be used carefully and a long shovel used to ensure accurate placing. When the building up is dangerous, i.e., when it prevents adequate drainage of the furnace, silica sand can be used, provided that the rest of the bottom is protected by lime. This usually occurs at some place on the tapping slope and if it is above the slag line, powdered 75 per cent ferrosilicon can be used and placed in position with a small shovel from the tapping side. This flux is so viscous that it should only be used where it cannot possibly attack the hearth, i.e., in the mouth of the taphole when the charge is nearly ready for tapping. Piers of material jutting out from the banks can often be moved

INGOT MAKERS SINCE 1888



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manually immediately after tapping when they are hot and comparatively weak. In one particular case, when the furnace hearth had assumed a cloverleaf shape, the banks were shaped up after the furnace had cooled down for a sidewall rebuild by using the heavy pneumatic drill such as is used for breaking concrete.

The attack by mill scale is oxide attack. This is effective when dealing with lime owing to the formation of low melting point calcium ferrites. This is a mixed blessing because although it will prevent damage to the hearth proper, it renders the use of scale almost ineffective when the base of the bank builds up through careless repairing. Sand or fluorspar can be used; in the author's opinion, it is better to use silica sand placed carefully rather than the haphazard use of fluorspar.

Speed is an important factor in furnace maintenance. Unlike the open-hearth furnace, once the charge is tapped, there is no method of retarding the cooling of the arc furnace. The development of an oil burner to give a long fierce flame would help a lot as it could be directed on to a heavy patch and fuse it well before charging. Under present conditions, repairing must be done as rapidly as possible though it is essential to deal with any holes or metal left in the furnace first. Scaling or sanding of thickened portions can be left until the repairs are completed. Up to now, the use of graded dolomite for repair purposes has found little favor, because of the high proportion of fines it contains, it segregates badly when thrown onto the banks or bottom. If it is bonded with 5 to 6 per cent tar, the segregation does not occur but there is some difficulty in throwing it accurately and visibility in the furnace is reduced to nil by the burning tar. Experiments with graded dolomite and 2 per cent tar show some promise of success and these are still in progress. Maintenance of the furnace structure apart from the hearth is not the direct concern of the furnaceman but the work of the bricklayers can be lightened and the time and money lost on repairs can be reduced by care and observation by the furnace crew. During the melt and oxidizing periods the bath should be kept boiling if possible to reduce reflection of heat on to the roof and walls.

Boil Proves Advantageous

For metallurgical reasons as well, this is good practice. A boil during the melt has several advantages, it assists in the elimination of phosphorous and nonmetallic inclusions. Slag viscosity is also important; a thick, heavy slag will reflect heat onto the roof and walls and so will the thin, glassy type. Again, a heavy slag, whatever its chemical constitution, will have little effect on the bath if it is viscous and physically inactive and a thin slag will be lacking in basicity and tend to attack the slag line. Constant light additions of fine carbon to the refining slag will keep the slag in a slightly effervescent condition and keep it nonreflecting. To prevent the premature collapse of arches, the banks supporting the jambs should be particularly well repaired, using tarred dolomite when necessary. Undermining of the jambs may easily lead to complete collapse of the arch and not only is there time and money lost in replacing this but the effect of so much silica on the refining slag is disastrous. The slag thins off and picks up oxide, increasing the change of a dirty cast, and if the basicity is not quickly restored, severe cutting of the banks at the slag line ensues. For the same reasons, arches that are rebuilt during the campaign must have firm foundations and a little extra time spent in ensuring this is highly recommended.

To sum up the available information and taking into account the relative costs and availability of the various refractories, the best types to use for the various parts of the furnace are as follows: silica bricks are almost the universal choice for roof construction. Until basic bricks are made without after-contraction and the bursting tendency of the chrome-magnesite type, they cannot be considered for roof building. Sillimanite or super-duty firebricks can be used with success only on furnaces working intermittently and even so, it is doubtful if they can show any economic advantage

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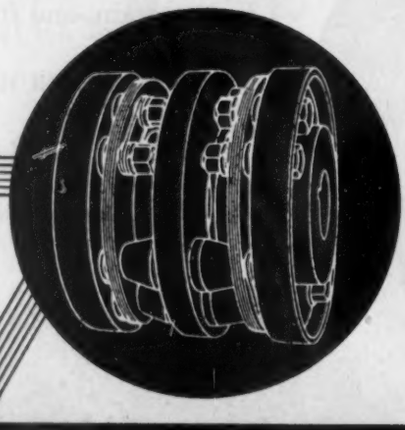

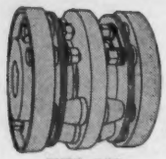
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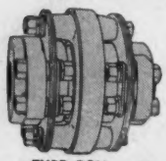
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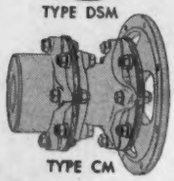
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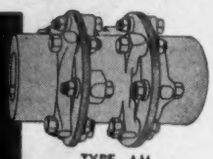
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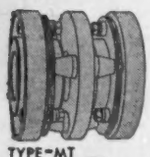
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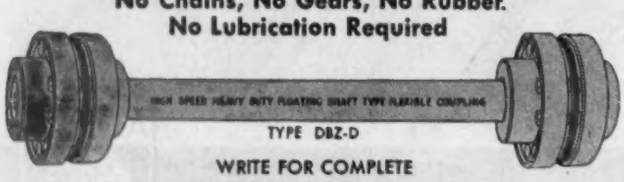
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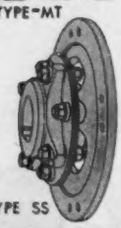
TYPE SS

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over silica. Particular attention should be paid to the design of the roof and the special shapes kept as small as possible to ensure that they can be hard fired with standard squares. Mathematical study of roof shapes and contours would be advisable as the circular roof cannot be built on the same principles as the open-hearth furnace roof.

Walls Present Problem

The walls of the furnace present a more complicated problem. If the furnace is small and has a low-power input, say a 2-ton furnace working on 85 volts and 3000 amperes, silica walls will give satisfactory service. High power, particularly high-voltage melting is favored today for economic reasons and the resulting long, fierce arc brings refractory problems in its train. At the start of the melt, when the arc is well buried in the scrap, the walls are not affected but when the scrap gets cut down, exposing the walls, trouble begins. With silica walls, the choice lies between burning the walls and reducing the power input and with it, the melting efficiency. Silica, therefore, cannot be considered for sidewall construction in a modern furnace except as an emergency repair. Magnesite bricks began to show promise immediately before the war and phenomenal lives have been experienced in the United States with metal-cased brick.

All domestically produced magnesite is required for other things and shipping situation prevents any large imports so magnesite bricks of any type can be ruled out, at any rate at this stage in the conflict. The same argument applies to a slightly lesser degree to chrome-magnesite bricks. Danger of chromium pick up in the steel and the bursting of these bricks are other points to be considered. Stabilized dolomite bricks are out of the question because they spall badly in the temperature fluctuations of the upper furnace structure. Dolomite bricks of the semistable variety are most suitable because their resistance to slag and spalling is higher than the stable bricks. The two disadvantages of this brick are inability to keep in good condition for any length of time and a slight after-contraction which causes the inner course to cave in after a period of service. A 10-degree slope from the vertical of the sidewall shell would eliminate any trouble from this direction and has many other advantages such as increased furnace volume and saving in refractory thickness in the lower sidewalls, i.e., below the slag line.

Door and tapping arches, if of small span, can be constructed of semistable dolomite, but if the span is fairly large, silica must be used.

Magnesite bricks are usually used for the lower part of the walls and the bottom as an insurance against breakouts but this is not practicable now. Stabilized dolomite has given perfectly satisfactory service in this part of the furnace. Magnesite has never been popular in this country for furnace hearths and only dolomite can be considered in

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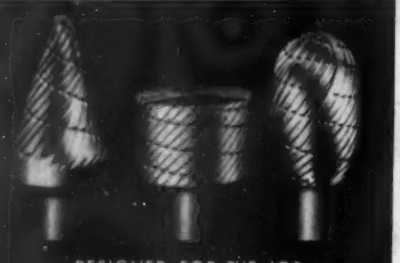

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wartime. The use of graded material is definitely an asset but the grading should be kept slightly coarser than that recommended by the technical panel of the basic furnace linings committee. Careful maintenance of the hearth is the keynote of good bottom life and also of quality steelmaking.

Benzene Vapor Controlled by Inert Gases

Benzene vapor, a highly inflammable material used in manufacturing explosives and by the solvent industry, can be handled safely in industrial plants by adding correct amounts of certain inert gases to the benzene, according to a publication of the Bureau of Mines, Department of the Interior, Washington 25, D. C. Carbon dioxide or nitrogen, or a mixture of the two, are the inert gases that may be used.

The report "Prevention of Benzene-Air Explosions by Addition of Nitrogen and Carbon Monoxide," describes research in an experiment conducted by the bureau to determine inflammability and explosibility of various industrial gases and dusts. It contains the necessary information for calculating the explosibility of complex combustible gassy mixtures containing various percentages of benzene vapor.

Included in the report are tables showing inflammability limits of other industrial gases: Coke oven gas, hydrogen-nitrogen and hydrogen-carbon dioxide mixtures, carbon monoxide-nitrogen and carbon monoxide-carbon dioxide mixtures, methane-nitrogen and methane-carbon-dioxide mixtures, ethylene-nitrogen and ethylene-carbon dioxide mixtures, ethane-nitrogen and ethane-carbon-dioxide mixtures. Also listed are the composition and limits of inflammability of such air-free gases as coke oven gas, coal gas, carbureted water gas, mixed natural and water gas, oil gas, water gas, producer gas, and blast furnace gas.

Hearings To Be Opened On Radio Spectrum

Proposed reallocation of the radio spectrum will be the subject of a series of hearings before the Federal Communications Commission in the near future. Three bands will be proposed for simultaneous use by medical services and for industrial induction heating.

The bands which the commission says should meet all requirements of these fields have a center frequency of 13.66 megacycles, 27.32 megacycles, and 40.98 megacycles. They are swing bands with an allowance of plus or minus 0.05 per cent.

A series of hearings of people interested in the proposed reallocation will be opened on Feb. 28 and will continue for a week or more. The commission hopes to announce final allocations sometime between March 1 and 15.

Skid-Lift-Truck Handling

(*Continued from Page* 110)

the storage area a supply of these skids together with a supply of the skid tote boxes previously mentioned, for use in unitizing loads of one or more lots of smaller parts. As manufacturing orders are received by the stores department, the materials called for are withdrawn from stock to the skids and tote boxes to await transportation orders from the dispatching department. These orders are issued to the truck operators who proceed to storage and quickly deliver the loads to the designated machines.

A second and closely related problem consisted of the delivery of work through successive machine operations to the stock areas adjacent to the assembly line. As production increased, these deliveries overtaxed the capacity of the cranes and transfer cars and thus resulted in delays. In addition, the increased stock of finished parts necessitated the use of storage space beyond the reach of existing craneways.

To complete the necessary finishing operations, a number of the parts must be handled between as many as eight different machines. When it was necessary to do it by means of transfer cars, loading and unloading the parts one at a time by crane, a substantial amount of time was required. Sometimes the trips required the use of more than one transfer car.

Jib Cranes Transfer Work

Now parts are deposited on skids at the various machines as the work is completed, either the same skid on which they arrived or an empty, so that when the lot is completed it may be taken by truck directly to the next operation. The greatest gain has been made in parts such as sheaves, shafts, gears, etc., which are just beyond the range of safe manual handling yet can be handled in multiple units on skids. Jib cranes are provided to transfer work between the skids and the individual machines.

A substantial gain has also been made in handling parts such as brake bands which are interchangeable among numerous models of shovels and cranes, and therefore can be mass produced. They make stable loads piled on skid platforms, and this permits handling them in larger units than was formerly possible.

All work movements are controlled by a dispatcher in whose office, centrally located in the machine shops, manufacturing orders are filed in pigeonholes designated with the name and number of the machine where the work is in process. As each operation is completed, the dispatcher shifts the position of the order in his file and issues a transportation order for delivery of the work to the next machine. This order is picked up and executed by the next truck operator to come into the dispatcher's office. Truck operators, according to established routine, return to the dis-

patcher's office for further orders after completing each delivery.

The cranes and transfer cars are now used only for the handling of heavier work beyond the capacity of the industrial trucks.

Batteries for the industrial trucks are charged and watered in the shops near the dispatcher's office. They are exchanged at intervals of eight to twelve hours in order to maintain the trucks in continuous operation. They are lifted between the trucks and the charging benches by either the traveling crane or a jib crane.

Corrections Issued on Aeronautical Materials

Aeronautical material specifications, issued as of November 1, 1944, by Society of Automotive Engineers Inc., which were reproduced in STEEL Dec. 18, 1944, have been found to be incorrect in several instances. Corrections issued by SAE on the new and revised specifications are listed below.

AMS 3197A—In Paragrah 5(d) "Sizes"—Specific Volume for 1 inch thick material listed as 197 cu. in. per pound should be 97 cu. in. per pound.

AMS 3207B—In Paragrah 5(e) "Low Temperature Brittleness"—ASTM 736-43T should be ASTM *D*736-43T.

AMS 3209B—In Paragraph 5(e) "Low Temperature Brittleness"—ASTM 736-43T should be ASTM *D*736-43T.

AMS 3214A—In Paragraph 5(b) "Fuel Aging" — Temperature 70°-85°F should be 75°-85°F.

AMS 3630—In Paragraph 5(g) "Oil Aging"—Petroleum Base Lubricating Oil should be Petroleum Base Lubricating Oil No. 3.

AMS 4130B—In Paragraph 2 "Composition"—In first line of table Copper 5.9-5.0 should be 3.9-5.0.

In Paragraph 3(b) "Condition"—3rd line of table, Equivalent Extension under Load 0.0038 should be 0.0098.

In Note: Similar Specifications: Navy 48A7 should be Navy 46A7.

AMS 4140B — In Paragraph 2 "Composition"—In first line of table Copper 0.50-4.50 should be 3.50-4.50.

In Paragraph 4(d) "Condition"—Brinell load should be 1000 kg instead of 1080 kg.

In Note: Similar Specifications: Federal QQ-A-387 should be Federal QQ-A-367.

AMS 6531—In Paragraph 2 "Composition"—In last line of table Molybdenum 0.15-0.24 should be 0.15-0.25.

—o—

Newly developed industrial uses for helium, chiefly in welding magnesium and its alloys and now widely employed in the aircraft industry, increased the sale of this noninflammable gas to commercial distributors in the United States to more than ¾ million cubic feet monthly during 1944, according to the Bureau of Mines, Department of the Interior, sole producer of helium.

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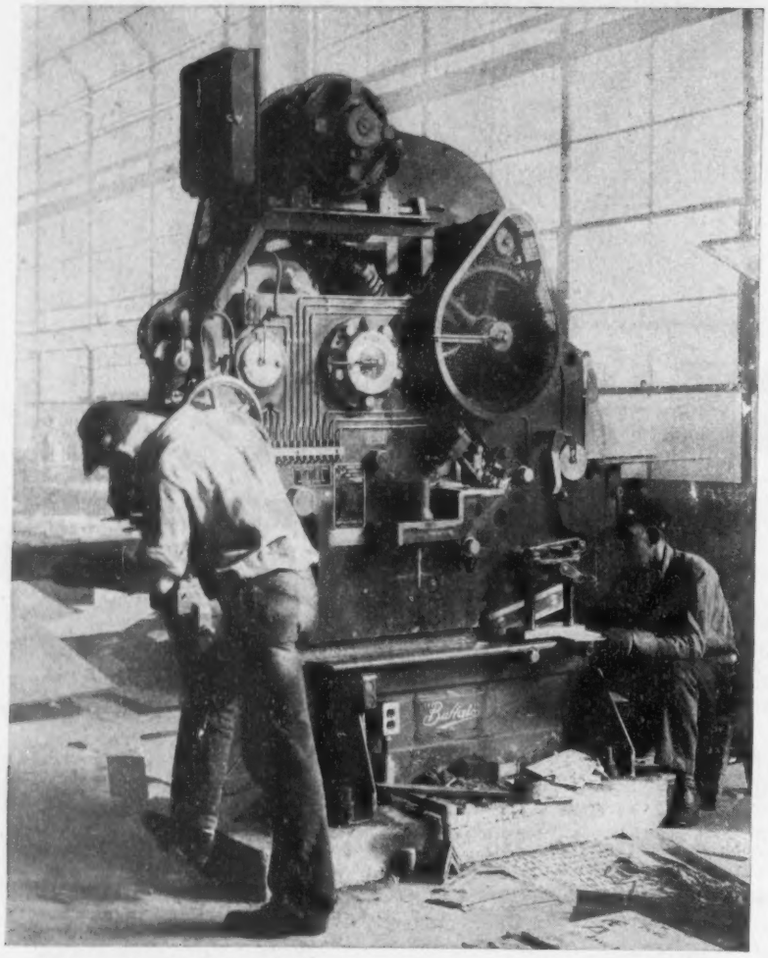

Putting Maintenance on a Production Basis

By shortening the time required to cut and punch steel plate, angles, tees, beams, and other shapes used in industrial maintenance work, many repair shops are putting maintenance on a production basis. Railroads, steel mills, heavy industries of all kinds use Buffalo Universal Iron Workers to speed up repair work, on new construction, and frequently on straight production work.

Buffalo Universal Iron Workers are made in fifteen sizes, with punch capacity ranging from 13/16" x 7/16" on the No. 0 to 1-3/4" x 1-1/2" on the No. 29 U.D. Shear capacity on the No. 0 is 3/8" plates on the largest size, 1-1/2" plates. Standard bar-cutter knives handle angles, tees, beams, channels, rounds and squares,—with special work at the machine at one time, so there is no waiting for access to the various tools.

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"Buffalo" **Universal Iron Workers**

Adverse Weather Cuts Into Steel Production Severely

National rate lowest since 1940. . . . Rail embargoes limit raw materials. . . Pig iron, scrap short. . . Export locomotives placed

ADVERSE weather conditions and traffic congestion are causing producers to lose ground in their attempt to get in raw materials, pig iron, scrap, fuel oil, coal and coke in particular, and steel buyers are running further behind in receipt of needed finished material.

While current embargoes probably will prove generally beneficial in the long run and are helping in movement of munitions and other essentials they have tied up temporarily shipments of many items needed in production of these essentials. Actual upturn of steel production in some districts may not come for another week or longer, much depending on the weather.

This situation, linked with further substantial buying, is forcing delivery schedules back all along the line. Sheet delivery promises fall generally well into third quarter, with carbon bars not far behind. In some grades and sizes of these products some producers are booked into fourth quarter. In plates, which are in less demand than formerly, several sellers quote June, with at least one large sheared plate producer offering April delivery.

Reflection of these conditions is found in the national steel production rate, which last week declined 1½ points to 89½ per cent of capacity, following a drop of 2½ points the prior week. This is the lowest production rate since early September, 1940. Some gains were made in districts which had suffered deeply from the snow blockade, Buffalo gaining 26 points to 69 per cent, Youngstown 3 points to 83 and Cleveland 7 points to 86½. Pittsburgh dropped 7 points to 80½ per cent, Wheeling 9½ points to 88, Cincinnati 3 points to 92, New England 2 points to 92 and eastern Pennsylvania 6 points to 87. Rates were unchanged as follows: St. Louis 75, Chicago 99½, Detroit 87 and Birmingham 95.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Feb. 10	Change	Same Week 1944	Same Week 1943
Pittsburgh	80.5	—7	99.5	99
Chicago	99.5	None	102	100
Eastern Pa.	87	—6	94	93
Youngstown	83	+3	95	97
Wheeling	88	—9.5	101	80
Cleveland	86.5	+7	97	93
Buffalo	69	+26	88.5	90.5
Birmingham	95	None	95	100
New England	92	—2	95	95
Cincinnati	92	—3	94	90
St. Louis	75	None	79.5	93
Detroit	87	None	75	90
Estimated national rate	89.5	—1.5*	100	*99

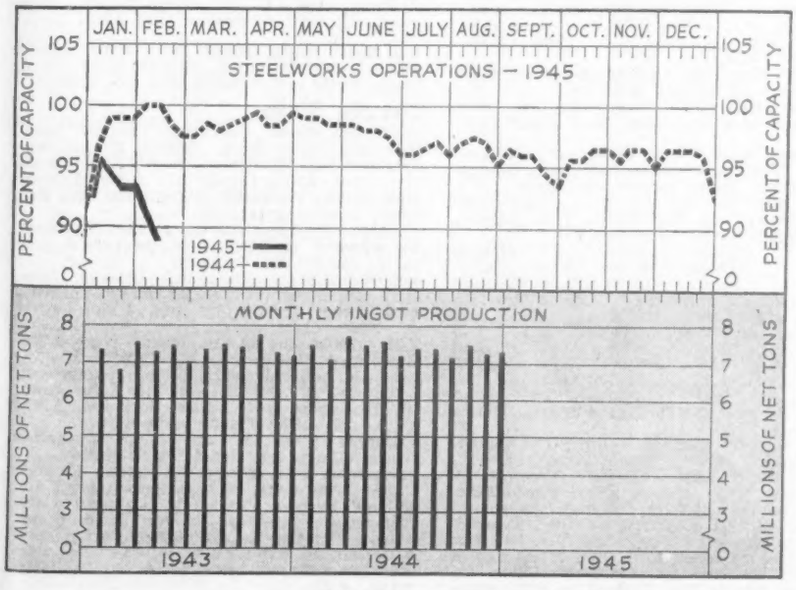
*Based on steelmaking capacities as of these dates.

Lack of pig iron handicaps foundries dependent on furnaces which have been slowed by snow and inability to move their product. This is notably the case in territory normally supplied from Buffalo stacks, including New England and the eastern seaboard. These producers have piled much iron through inability to ship and some loaded in cars has been delayed on track. Considerable borrowing from other foundries has been done and tonnage has been taken from the stock of the New England furnace. At the same time this shortage developed cast grades of scrap have been scarcer than recently. As a result considerable castings tonnage has been lost, numerous foundries suspending or reducing production.

Scrap supply to consumers has been curtailed by snow blockades and by shortage of yard workers. Collection and preparation have been limited by both these factors. Better war news has not repeated the optimism of last fall but both dealers and consumers are wary and seek to avoid accumulations which might be a burden in case of sudden war cessation. WPB continues to ship steelmaking scrap from Pacific Coast shipyards to the middle west, supply on the coast being greater than needs. Numerous steelmakers have used considerable tonnage from stocks during the railway blockade and most of them are willing to accept first grade material whenever offered.

Following heavy orders for freight cars late last year only 7200 were placed in January and decreased buying is expected for following months. The locomotive market is enlivened by purchase of 200 addftional locomotives by the French provisional government, bringing its total to 700, and placing of 500 for Russia. These were placed mainly with American Locomotive Co. and Baldwin Locomotive Works, with part of the French order to Lima Locomotive Works.

Average composite prices of steel and iron products are frozen at levels of the past few weeks as OPA ceilings remain unchanged. Finished steel composite is $57.55, semi-finished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.



COMPOSITE MARKET AVERAGES

	Feb. 10	Feb. 3	Jan. 27	One Month Ago Jan., 1945	Three Months Ago Nov., 1944	One Year Ago Feb., 1944	Five Years Ago Feb., 1940
Finished Steel	$57.55	$57.55	$57.55	$57.22	$56.73	$56.73	$56.73
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	17.10

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Feb. 10, 1945	Dec., 1944	Oct., 1944	Jan., 1944
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.20	2.15	2.10	2.10
Plates, Philadelphia	2.25	2.225	2.15	2.15
Plates, Chicago	2.20	2.15	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.15	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.65	3.60	3.50	3.50
Sheets, hot-rolled, Gary	2.20	2.15	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.65	3.60	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.80	2.70	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to $\frac{9}{32}$-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Feb. 10, 1945	Dec., 1944	Oct., 1944	Jan., 1944
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern del. Philadelphia	25.34	25.34	25.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2 del. Cincinnati	24.30	24.30	24.30	24.30
No. 2 fdry., del. Phila.	25.84	25.84	25.84	25.84
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap

Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$17.15	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	15.50	18.75
Heavy melting steel, Chicago	18.75	18.75	16.70	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace, ovens	$7.00	$7.00	$7.00	$7.00
Connellsville, foundry ovens	7.75	7.75	7.75	7.75
Chicago, by-product fdry., del.	13.35	13.35	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill. Kaiser Co. Inc. $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop., $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34; Detroit, del. $36; Duluth (bil) $36; Pac. Ports, (bil) $46. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. Ports).

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, billets, $42; forg. bil. f.o.b. Pac. Ports, $52.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—$\frac{9}{32}$ in. inclusive, per 100 lbs., $2. Do., over $\frac{9}{32}$—$\frac{11}{32}$-in., incl., $2.15; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific Ports $0.50. (Pittsburgh Steel Co,, $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Calumet Steel Division, Borg Warner Corp., and Joslyn Mfg. & Supply Co. may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.

(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.39
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00c, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.65c; Granite City, base 3.75c; New York del. 3.89c; Phila. del. 3.82c; Pacific ports 4.20c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.75c; Granite City, base 2.85c; Detroit, del. 2.85c; eastern, Mich. 2.90c; Pacific ports 3.40c; **20-gage;** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.35c; Detroit del. 3.45c; eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.20c; New York, del. 2.39c; Phila., del. 2.25c; St. Louis, 2.44c; Boston, del. 2.52-77c; Pacific ports, 2.75c; Gulf ports, 2.55c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b St. Louis. Geneva Steel Co., 3.25c, Pac. ports); Kaiser Co. Inc., 3.20c f.o.b. Los Angeles.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.60c
Spring wire 3.20c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.80; galvanized, $2.55; Pac. ports ..... $3.30 and $3.05
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.40c
Woven fence, 15½ gage and heavier, per base column ..... .67c
Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	...
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2½"	12	16.01	18.45	15.16	.....
2¾"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $43.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $43 net ton, base, Standard spikes, 3.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	‡‡18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller ..... 65½ off
Do., ⅞ and ⅝ x 6-in. and shorter ... 63½ off
Do., ⅞ to 1 x 6-in. and shorter ..... 61 off
1⅛ and larger, all lengths ..... 59 off
All diameters, over 6-in. long ..... 59 off
Tire bolts ..... 50 off
Step bolts ..... 56 off
Plow bolts ..... 65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
⅞-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller ..... 64 off
Milled 1-in., smaller ..... 60 off

Square Head Set Screws

Upset, 1-in., smaller ..... 71 off
Headless, ¼-in., larger ..... 60 off
No. 10, smaller ..... 70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural 3.75c
⅞-inch and under ..... 65-5 off
Wrought Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. ... $2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.00
Connellsville, foundry	7.50- 8.00
Connellsville, prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75
By-Product Foundry	
Wise county, furnace	6.75- 7.25
Kearney, N. J., ovens	12.65
Chicago, outside delivered	12.60
Chicago, delivered	13.35
Terre Haute, delivered	13.10
Milwaukee, ovens	13.35
New England, delivered	14.25
St. Louis, delivered	†13.35
Birmingham, delivered	10.50
Indianapolis, delivered	13.10
Cincinnati, delivered	12.85
Cleveland, delivered	12.80
Buffalo, delivered	13.00
Detroit, delivered	13.35
Philadelphia, delivered	12.89

*Operators of hand-drawn ovens using trucked coal may charge $7.75, effective Nov. 29, 1943. †13.85 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.144[11]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[25]	4.072[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.75[21]	4.669	5.60[23]	5.75[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.65[21]	4.35	5.60[23]	5.75[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.40[24]	3.75[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.75[21]	4.45[21]	5.60[23]	5.65[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.800[21]	4.659	5.93[23]	5.93[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[19]	5.443[24]	4.443[12]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	6.391[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[12]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[16]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.75[21]	4.65	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.887[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	3.98[21]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[15]	4.46[24]	4.361[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[15]	4.347[24]	4.031[21]	4.931	6.131[23]	6.231[23]
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[15]	4.78[24]	4.33[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.54	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.60[22]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.763[3]	4.313[3]	4.313[3]	5.313[26]	4.10[10]	3.65[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[12]	7.20[6]	5.583[22]	5.613	5.85[22]	5.95[23]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[15]	7.30[15]	5.333[21]	7.333	8.304[23]	8.404[23]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[15]	6.60[15]	5.533[15]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.60[15]	5.783[21]	.....	.....	8.00[23]
Seattle	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.05[15]	5.783[21]	.....	.....	8.00[30]

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 18 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural)

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail)	
48% 3:1	52.80
less $7 freight allowance	

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per GT	Electric furnace Bars per 100 lb.	Electric furnace Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.53	26.03	27.53	27.03
Brooklyn, N. Y., del.	27.50	.....	.....	28.00
Birdsboro, Pa., base	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	25.00	.....
Baltimore, del.	25.61	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	24.22	.....	.....	.....
Cincinnati, del.	24.06	22.68	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.15	.....	.....	.....
Philadelphia, del.	25.46	24.96	.....	.....
St. Louis, del.	24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.10	24.60	25.60	25.10
Muskegon, Mich., del.	27.19	.....	.....	27.19
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.39	24.89	25.89	25.39
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del	26.31	25.81	26.81	26.31
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.63	26.13	27.13	26.63
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston, del.	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.44	24.61	.....	25.11
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del. No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, base	25.00	24.50	.....	.....
Baltimore, del.	25.99	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.84	25.34	.....	26.34
Toledo, O., base	24.00	23.50	24.50	24.00
Youngstown, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	25.94	25.44	25.44	25.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

5.00-6.50 per cent (base).....$29.50

6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00

Gray Forge

Neville Island, Pa. $23.50
Valley base 23.50

Low Phosphorus

Basing points: Birdsboro, Pa., $29.50; Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $26.50.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co., (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $2 per ton, effective May 20, 1943. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942. E. & G. Brooke Co., Birdsboro, Pa., allowed $1 above basing point.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $66.55

First Quality

Pa., Ill., Md., Mo., Ky.	52.85
Alabama, Georgia	52.85
New Jersey	57.70
Ohio	46.35

Second Quality

Pa., Ill., Md., Mo., Ky.	47.90
Alabama, Georgia	39.15
New Jersey	50.50
Ohio	37.10

Malleable Bung Brick

All bases 61.65

Silica Brick

Pennsylvania	52.85
Joliet, E. Chicago	60.65
Birmingham, Ala.	52.85

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	31.95
Wire cut	29.90

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium, 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa. $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western, 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome: Add 5c to all high carbon ferrochrome prices; all zones; **low carbon** eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed, 14.45c ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% Max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central: $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 and $2.023 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max., sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate, to which equivalent of St. Louis rate will be allowed; spot, up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide, approx. 10% and calcium oxide approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed, per pound vanadium oxide contained; contract, carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract, ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309, Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20%, mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.), per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c, eastern, freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and .5c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c, 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western, 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 c.l., 35c; central, 34.25c and 36c; western, 34.55c and 38.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99% per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40; eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15%, net ton to carload, 8c lb. F.O.B. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern, contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Bundles	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Machine Shop Turnings	13.75
Mixed Borings, Turnings	13.75
Shoveling Turnings	15.75
No. 2 Busheling	15.50
Billet, Forge Crops	21.25
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turning	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	12.00-13.00
Short Shovel Turnings	10.00-11.00
Mixed Borings, Turnings	10.00-11.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	15.50
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06*
No. 2 Heavy Melt. Steel	14.06*
No. 1 Bundles	14.06*
No. 2 Bundles	14.06*
No. 1 Busheling	14.06*
Machine Shop Turnings	9.06*
Mixed Borings, Turnings	9.06*
Short Shovel, Turnings	11.06*
Chemical Borings	13.06*
Low Phos. Clippings	16.56*
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

*Inland base ceiling; Boston switching district price 99 cents higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Mach. Shop Turnings	15.00
Short Shovel, Turnings	17.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	21.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	16.00-17.00
Cast Iron Borings	16.00
Machine Shop Turnings	14.00-15.00
Low Phos. Plate	21.00-22.00

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	11.00-12.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet, Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails, Random	18.50
Rerolling Rails	20.50
Angle, Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
No. 3 Galv. Bundles	16.75
Mix. Borings, Sht. Turn.	9.50-10.00
Machine Turnings	9.50-10.00
Short Shovel Turnings	10.50-11.00
Cast Iron Borings	10.50-11.00
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel. Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	13.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	10.00-10.50
Short Turnings	12.50-13.00
Cast Iron Borings	11.50-12.00
Low Phos Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	13.50-14.00

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	10.00-10.50
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	18.00
Grate Bars	15.25
Brake Shoes	15.25

(Cast grades f.o.b. shipping point)

Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	7.50- 8.00
Shoveling Turnings	9.50-10.00
Cast Iron Borings	9.50-10.00
Mixed Borings, Turnings	8.50- 9.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¼c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low-grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 flasks; $165 to $175 in smaller quantities.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more: New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½ copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 168

Sheet demand continues heavy and little tonnage can be taken in hot or cold-rolled carbon sheets before late third quarter. Some producers are booked into fourth quarter. Galvanized sheets are tightest grade and September seems the earliest delivery now available, with some producers sold for the entire year. Stainless sheets may be booked for May delivery and silicon grades in June or July, in some instances.

New York — Most sheet sellers are now booked well into third quarter on hot and cold-rolled grades. In fact, few have tonnage to offer before September and certain sellers are booked solidly into fourth quarter on either hot or cold-rolled. The tightest item of all continues to be galvanized sheets. Some tonnage is available in the heavier gages in August, but most tonnage now being offered is for shipment in September and beyond. In at least one or two instances sellers have nothing for the remainder of the year.

Delivery schedules on specialties continue to be delayed. Late May is now about the best that can be done on stainless steel sheets, especially those requiring a polish, and June and July seem to be about the average in silicon sheets. More extended silicon sheet deliveries are in the lighter gages, which are in special demand for radar equipment.

Locally sheets are in a brisk miscellaneous demand, although district metal workers report few new sizable programs at the moment. Incidentally, the recent flurry in hot and cold-rolled sheets, 16 to 22 gage inclusive, for practice bombs, seems to have subsided.

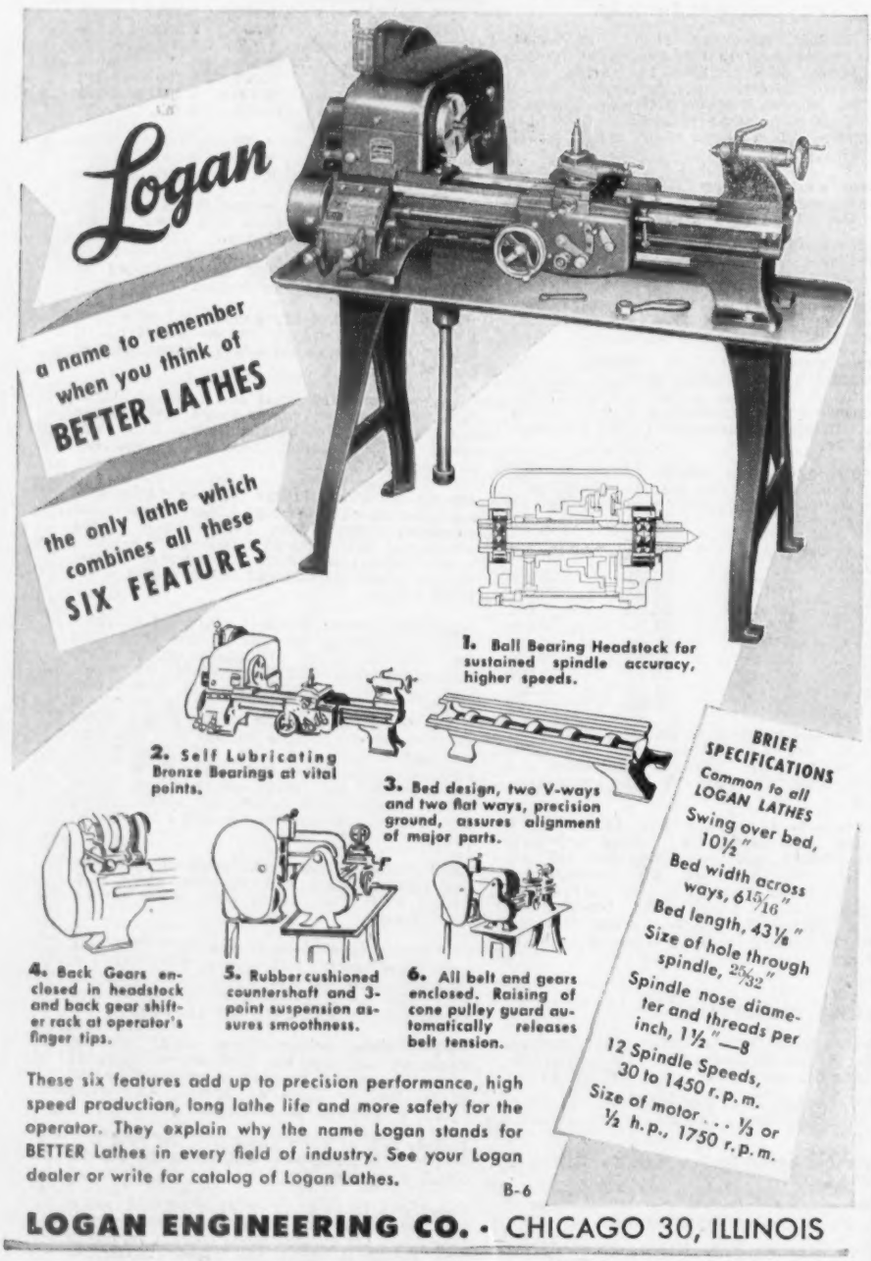
Boston — Narrow cold strip delivery schedules, heavily salted with directives, are extended to August. Carryovers into this month are heavier. Orders for small arms, belt links, rifle clips and landing mat springs are heavy. Hot melting schedules are more erratic, but shipments to rerollers, most covered through balance of this year, are steadier than to the general fabricating trade. For ammunition boxes, shell containers, rocket components and miscellaneous fabricated parts, sheet and strip demand is heavier. Considerable steel is wanted ahead of quoted deliveries. There is much shopping on a delivery basis and requests for directives to meet schedules. Numerous contracts have been reinstated and new ones placed. Stamping shops are also placing more tonnage, as are warehouses, who are pressing for deliveries. In turn, pressure on jobbers, in view of lengthening mill deliveries, is strong. A large part of increased production directives on galvanized is absorbed for Quonset huts, small warehouses and other light structures for the services, four mills being especially loaded.

Cincinnati — Sheet demand continues active, although volume accepted has declined somewhat from recent weeks. Backlogs on all grades are extended, and there is to be a carryover this month, partly due to loss in production attributed to severe weather conditions which curtailed natural gas supplies and created other handicaps.

Cleveland — Pressure for prompt shipment of hot and cold-rolled sheets is unabated, with a large portion of directive tonnage still being booked which has forced delivery on regular CMP orders to be delayed 30 days in some instances. Needs for drums, landing mats, and shell containers, which declined quite sharply a few months ago, have again been increased. There is little possibility of a further return of converted strip mills to production of sheets at this time, with an increase of 700,000 tons in Maritime Commission requirements reported. The landing mat program is now taking a considerably heavier tonnage of hot-rolled pickled and oiled sheets. This has pushed deliveries back substantially on these grades, into September in some instances. Deliveries on hot and cold-rolled sheets are being promised for late June. Aircraft demand for stainless has made a marked improvement lately.

Chicago — Extreme tightness in sheets is reflected in the fact that hot-rolled pickled sheets are in January, 1946, delivery, and cold-rolled are in October. Hot-rolled pickled strip is September. Galvanized steel, 16-gage and lighter, also are January, 1946; 18 and heavier, May; 19 to 26-gage, May; and 27 and heavier, October. All formerly were August. Hot-rolled sheets and strip are August, as well as for wide and narrow strip. Strip mill size sheets are in November. A toy manufacturer in the district has a contract for five-gallon blitz cans, and to meet delivery is seeking a directive on cold-rolled sheets.

Pittsburgh — Some producers here believe a complete revision in sheet order books will be necessary to bring order out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of the chaos created by the freight embargoes and the fuel shortage. Heavy tonnage losses at several key sheet mills have added tremendous tonnages to the carryover into March, none of which can be made up. In fact, there is good reason to believe further losses can be expected before the end of February. This situation has pushed backlogs higher, extended deliveries farther, and created a need for shifting some sheet tonnage from mills in the affected areas to other points in order to ease the load.

Philadelphia — Sheet delivery promises vary widely, making it possible by shopping widely to obtain fairly good promises on some grades. In hot-rolled pickled sheets one large producer is quoting late July and August, while others have little to offer before fourth quarter. A limited tonnage of plain hot-rolled can be obtained for June. In cold-rolled the general spread appears to be August to late October. A little galvanized is available in August but some producers are sold out for the year.

Steel Bars . . .

Bar Prices, Page 168

Numerous bar mills are booked for entire production for first half on carbon bars and are approaching that position on alloys. While most demand comes from ammunition and gun manufacturers, considerable is from shipbuilders, railroads and aircraft builders, the latter taking alloys in large quantity. Cold-drawn bars are available no earlier than late third or fourth quarters. Directives are being used, but sparingly.

Cleveland — Carbon and alloy steel bar requirements continue to increase, reflecting the expanding demand for the heavy shell, tanks, large trucks and small arms programs. Needs of bolt and nut manufacturers have also been stepped up sharply. Forge shops and cold-rollers are currently as active as at any time in the war period. Mill deliveries on large rounds are extended through September, and into July on smaller sizes. Increased aircraft and tank program has materially stepped up requirements for alloy bars and still further expansion is indicated. Sporadic interruptions to mill operations due to the shortage of gas and coal, plus the rail embargo, have also been a factor in extending mill deliveries on all products.

Boston — With an all-time peak demand developing for shells, carbon and alloy bar orders, for ordnance components and miscellaneous needs, including barrel blanks for small arms, frequently necessitate directives on most urgent tonnage. Demand is filtering down to more subcontractors as deliveries lengthen. While increased carbon volume is heavy, alloys share in proportion, notably for heavy forgings in one case in the Worcester district. Alloys are now taken for May delivery and if heat treated, for June. Existing contracts are frequently revised upward. New awards for chemical warfare mortar shells include contracts to A. S. Campbell Co., East Boston, and Bell Aircraft Corp., Burlington, Vt. Bird & Son Inc. has additional shell contracts; a special plant will be operated at Wrentham, Mass., with additional machinery. The largest inquiry bid by rerolling mills in some time includes hundreds of thousands of barbed wire posts. Springfield armory, increasing operations, could use up to 3500 more employes and is placing a third of present force of 9600 on a schedule which calls for work alternate Sundays.

New York — Strong pressure for bars of all leading grades, carbon, both hot-rolled and cold-drawn, and alloys, continues, with a result that most producers are out of the market for first half on carbon bars and are getting well booked up for that period on alloys. Some electric furnace alloys are available for late May and June, with orders coming in fast, and in open-hearth alloys most producers now are booked up solidly through first half, with at least one or two having nothing to offer before late August. Cold drawers are quoting third quarter and late in that quarter and early in the fourth quarter in certain instances.

Seattle—Bar mills are operating under limitations of restricted labor and considerable business has been refused as delivery could not be promised. Backlogs are being reduced slowly and additional tonnage is not desired at present. Merchant bars, flats and angles make up most of current orders. Reinforcing bars are in poor demand.

Chicago — Partly due to directives, the bar situation is growing progressively tighter. This applies particularly to larger sizes, which compete with shell rounds for rolling capacity. One bar-maker, who has shell schedules filled through third quarter, offers regular carbon bars for May and quality bars for November. The latter is a pushback of four months. Electric furnace alloy bars are in April and open-hearth bars

in June and July; large sizes are extended to October. Railroad car builders are among contractors beginning shell production. A farm implement manufacturer has scheduled 18,000 combines and 1250 corn pickers for production at its northern Indiana plant, but this is contingent upon what disposition is to be made of its expiring M-6 prime mover contract. If the latter is renewed, output of farm machinery will be small.

Philadelphia — With new facilities being brought into operation shell work continues to expand and in this immediate district machining operations are being increased. The entire ammunition and gun program is creating greater demand for carbon bars and miscellaneous demand is well sustained. Pressure from the aircraft industry in particular and from other sources is bringing out promises for June on electric furnace alloy bars and in some cases August on open-hearth grades.

Steel Plates . . .

Plate Prices, Page 169

Plate demand continues to decline and the situation for plate mills is easier than at any time last year. Further easing is expected as shipbuilding declines, miscellaneous needs being less, though directives still are necessary to obtain material needed for immediate delivery for war purposes.

Philadelphia — Plate producers report some slowing of demand for miscellaneous needs, though directives continue substantial. While late last year sellers expected considerable drop in operations by the end of this quarter they now expect output will be well sustained at least to midyear. Further substantial export orders for steam locomotives improving the outlook. Delivery of French and Russian locomotives recently placed will start in July and continue into next year.

Chicago — Although plate load still is heavy, situation of local mills is more comfortable than during most of last year. This is due partly to the fact that inland shipyards are not receiving renewal of contracts, principally because of manpower shortage. One yard in this area will complete its present contract in June. Prospect is that about midyear yards will be releasing workers in large numbers unless new contracts are obtained in the meantime. One mill reports all plate deliveries in July, another names June for universal plates and narrow sheared plates and July for wide sheared.

Boston — Contrary to over-all trends, demand for plates is tapering. Only in spots are shipyard requirements maintained; less tonnage moves to fabricating shops as subcontracting slackens. For a transfer of its operating base at Portland, Me., the Navy will take land on which the west yard of New England Shipbuilding Co. operates, after completion of current ship contracts, probably by June; Portland, Me., has been placed in group three labor classification from group two. This reflects layoffs in shipbuilding in that area. Liquidation of steel inventories in some cases is reflected in reduced warehousing space. Pressure for plate deliveries has largely disappeared, although transportation delays have slowed some shipments; warehouse stocks of plates are in better balance and demand has eased.

Cleveland — Plate production in this district has recovered nearly to normal levels prevailing during the closing weeks of last year. Republic Steel Corp.'s converted strip mill at its Corrigan-McKinney plant is back to practical capacity following a series of interruptions in the final weeks of January. Heavier plate requirements for the Maritime Commission have developed, which has at least temporarily delayed prospect of rolling additional sheet tonnage on converted strip mills.

Tubular Goods . . .

Tubular Goods Prices, Page 169

New York — Deliveries on pipe and tubing are expanding sharply. Most sellers have little butt-weld available before late May and June and in the case of lap-weld little before June, with larger sizes quoted in July by certain producers.

Most sellers of boiler tubing are now into June on hot-finished and in some cases well beyond that on cold-drawn tubing. One producer, for instance, now has little left for shipment before September. An increased demand for ship repairs is one factor while another which is now being felt more heavily, although not as yet to the full extent, is the new merchant ship program. Boiler tubing manufacturers will be called upon to supply quite a tonnage also for 1200 steam locomotives just placed for export, 700 for France and 500 for Russia.

Seattle — Demand for cast iron pipe is improving but dealers are handicapped by uncertain deliveries, not less than 60 days being required. Seattle has taken

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bids on 10,000 feet each of 4 and 6-inch, about 210 tons, to replenish stock and has two small jobs pending for about 100 tons.

Tin Plate . . .

Tin Plate Prices, Page 169

Pittsburgh — Fuel shortage and the freight embargo have cut tin plate operations somewhat. Most of the annealing furnaces on cold strip mills here are gas fired, and have been affected bp the gas shortage. There is also the problem of storage of finished plate. This has not yet been too serious, but it will undoubtedly have some effect on operating policies in that mills are averse to excessive rehandling of finished plate. Overall demand for plate is little changed. Development of new business from M-81 revisions continues light, although there has been a rebirth of lend-lease tonnage, contained in the new French rehabilitation program now being placed. It is doubtful if the total tonnage from this source will equal first quarter expectations, however.

Wire . . .

Wire Prices, Page 169

New York — All available capacity for production of tire bead wire is being pressed into service; pressure is so strong that only rope and signal corps wire is immune from displacement. Wire is frequently drawn, partially processed by one mill, and transferred to another for further processing to expedite delivery to tire plants. Sought are 14,000 tons a quarter. More CMP volume is pushed out of schedule and miscellaneous spring wire has been displaced in some cases. Carry-overs of January tonnage are heavier. Nail stocks with distributors are depleted; delivery on current orders is largely September and beyond. There is an acute shortage of nail kegs; one mill was forced to curtail nail machine schedules for two days recently because of lack of kegs. Bright wire to jobbers is in third quarter; one producer will take no orders for galvanized for delivery over the remainder of the year. Rods are scarce for September shipment.

Boston — Demand for rope, signal and tire bead wire is restricting supplies of drawn material in those sizes for most needs and affecting volume of semifinished for others. Additional directive tonnage has been placed, notably for tire wire; some mills are processing this grade for the first time. Pressure is unabated for signal, communications and assault wire, with stranding equipment and manpower bottlenecks. Backlogs in spring wire and numerous specialties are heavy with new volume seeking room on equipment; some spring wire has been moved back on schedules, but most urgently needed tonnage has been given firming directives in some instances. Mills are in third quarter on most new volume and indefinitely beyond on continuing directives.

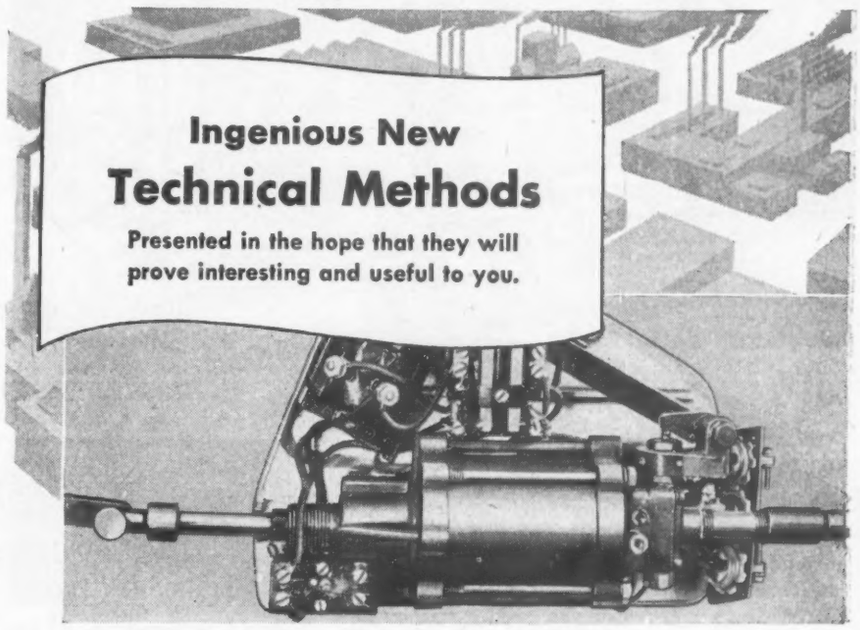
Pittsburgh — Adequate supply of rods seems to be the No. 1 problem, except manpower, in meeting wire production schedules at the moment. Nonintegrated producers report they could increase operations with better deliveries of raw material. Part of this, of course, is due to the freight situation. On the other hand, demand for all wire products has increased and the supply of rods is down somewhat due to low manpower on the primary mills and a lower supply of billets. One rod mill in this district which normally supplies a large number of nonintegrated wire producers has been idle for nearly a full week as a result of the freight situation. Demand for manufacturers' wire is still greatest in lighter gages, but there is no capacity available for any items before fourth quarter at most points unless the steel situation improves. Merchant items and some previously booked civilian goods orders for manufacturers' wire are rapidly being squeezed out of schedules.

Chicago — Nail demand is so great that jobber inventories have become acute. Industry, which is using large quantities for boxing and crating, is pressing for deliveries. Stocks of electrical wire, wire rope and construction material are being watched carefully to prevent shortages.

Semifinished Steel . . .

Semifinished Prices, Page 168

Pittsburgh — The fuel shortage and freight embargo caused a serious loss in ingot tonnage. The primary mills have been operating on a better basis than finishing mills in order to build up some stocks at the weakest points, but the ingot situation has hampered this activity. Billets, and subsequent products including wire rods, are probably the tightest spot at the moment. Idleness of several bar mills for several days gave some chance to catch up, but it is not feasible to build up any substantial stock of billets. Slab situation is fairly good at the



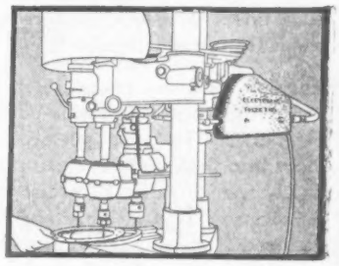
New Electroaire Power Unit Converts Standard Drill Press to Automatic

This exact control over feed and retraction speeds permits ready conversion of a standard drill press with tapping head into an automatic tapping machine, capable of producing Class III threads, even with comparatively unskilled operators. By adjusting speed to conform to the lead pitch of the threads being tapped, the tap will cut without forcing threads, and on the reverse the tap will actually "float" out of the part with no strain against the thread angle.

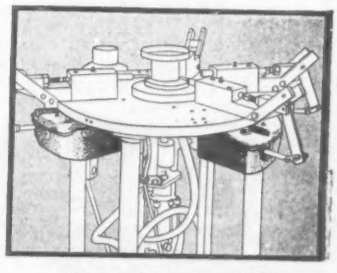
Air-powered jigs and fixtures can be opened, closed, and indexed by the Electroaire Power Feed. The unit can be set for a pre-determined number of cycles so that multiple holes can be drilled in the same piece without ejection, by means of an indexing fixture controlled and synchronized by the Electroaire Unit. One operator can run as many as two or three drill presses, turning out top-quality work with few rejects and with a minimum of tool breakage, thus effecting a great savings in time.

Present stockpiles of finest quality materials used in the manufacture of Wrigley's Spearmint chewing gum are now exhausted—necessitating discontinuance of production. When a supply of proven materials—known to be up to the finest standards of quality—is again available, Wrigley's will resume production—And Wrigley's Spearmint will be back to again help you on your job. In the meantime they are manufacturing a war brand. Wholesome but not excellent enough for the Wrigley brand name.

You can get complete information from Electroline Manufacturing Company, 1975 East 61st Street, Cleveland 3, Ohio



Set up to punch 3 holes simultaneously

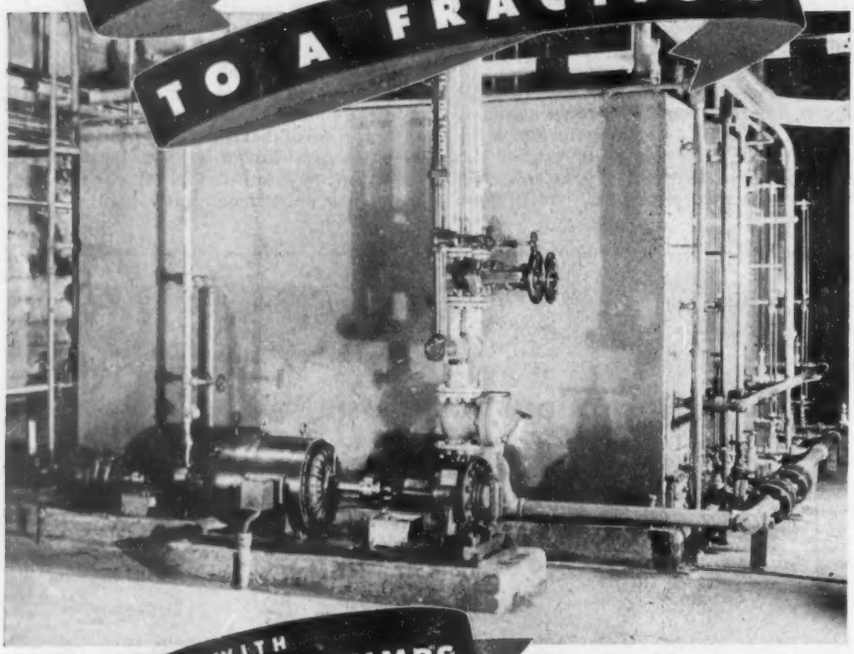


Shows holes being drilled automatically

Z-55 7

HOW A STEEL MILL...

REDUCES FRICTION TO A FRACTION



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moment, although peak demand will continue indefinitely and the balance must be maintained.

Rails, Cars . . .

Track Material Prices, Page 169

New York — Domestic freight car awards in January involved 7200 cars, compared with 16,245 in December, the largest monthly total for 1944, exceeding 13,240 in February, the previous high peak in that year. While a few fair sized inquiries are pending in the Middle West, the general trend this month is expected to continue downward. The largest recent award involves 300 refrigerator cars for the Fruit Growers Express Co., placed with the Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill.

Further monthly comparisons follow:

	1945	1944	1943	1942
Jan.	7,200	1,020	8,365	4,253
Feb.	.....	13,240	350	11,725
March	.....	6,510	1,935	4,080
April	.....	4,519	1,000	2,125
May	.....	1,952	870	822
June	.....	1,150	50	0
July	.....	795	4,190	1,025
Aug.	.....	3,900	8,747	0
Sept.	.....	400	6,820	1,863
Oct.	.....	2,425	5,258	0
Nov.	.....	1,065	870	0
Dec.	.....	16,245	2,919	135
Total	.....	53,221	41,355	26,028

New York Central has closed on 25 steam locomotives to the American Locomotive Co., for delivery this year. Each is to have not less than 6000 horsepower, the most powerful ever used by the company, it is said.

In addition to 500 steam locomotives recently placed, the French provisional government has closed on 200 more and Russia has placed 500. As the French distribution now stands, American Locomotive Co., New York, and Baldwin Locomotive Works, Eddystone, Pa., have each received 260, and the Lima Locomotive Works, Lima, O., 180. All are of 2-8-2 type.

The 500 Russian locomotives have been divided equally between American and Baldwin. These are of the 2-10-0 type. The Russian locomotives have been purchased under a lend-lease arrangement.

Deliveries on both the French and the Russian orders are scheduled to begin in July and be completed by the end of the year. However, as steel deliveries are requested to begin in April in order to meet this schedule, it would appear as if it might meet delay, unless directives are issued. Some plate tonnage might still be picked up in April, but the situation with respect to castings and heavy forgings is tighter and this would also apply to such bars as would be required.

A further complication with respect to the French locomotives is the fact that even now all details as to design have not been definitely decided upon by French engineers.

Structural Shapes . . .

Structural Shape Prices, Page 169

Boston — Although a forge shop at Lowell, Mass., requires approximately 1000 tons, inquiry for structural steel is light; deliveries are extended to May on more sizes, a result of demands on structural mills for shell steel and limited supply of ingots rather than heavy demand for shapes. Directives covering pontoon angles will continue into March, but less

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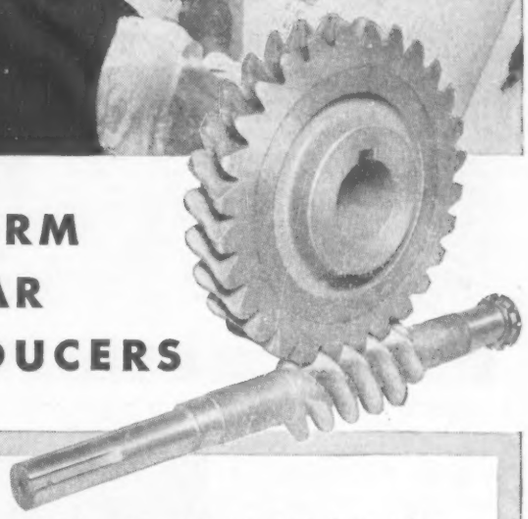

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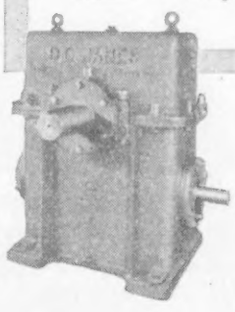

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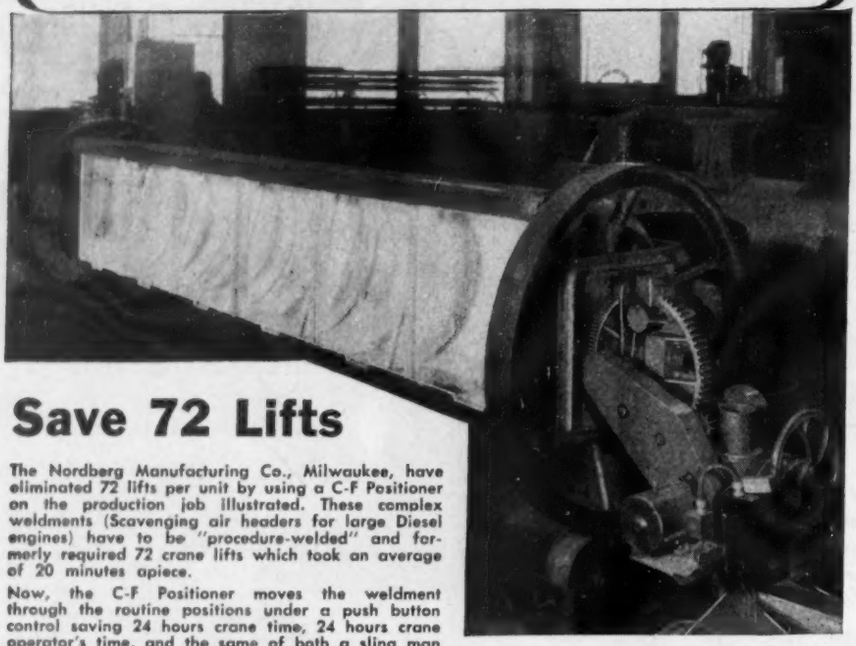
C-F POSITIONERS



Save 72 Lifts

The Nordberg Manufacturing Co., Milwaukee, have eliminated 72 lifts per unit by using a C-F Positioner on the production job illustrated. These complex weldments (Scavenging air headers for large Diesel engines) have to be "procedure-welded" and formerly required 72 crane lifts which took an average of 20 minutes apiece.

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Write for Bulletin WP-22

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tonnage is taken in this area; shops are sharing little in this program. For shipbuilding, additional tonnage placed by the Portland, Me., yard largely fills needs for contracts nearing completion. Neponset district yard has contracts for repairs to landing craft, delaying schedules on coast tankers. Structural fabricating shops are slackening, buying little. Warehouse inventories are moderate, supplying most light iron shops. Awards include 450 tons for an infirmary at Rocky Hill, Conn. A Boston contractor has placed 15,000 small frames, averaging 60 pounds each. Light structurals are also being utilized for staying cargoes in some instances while small steel-frame buildings for the services account for large tonnages. Two Boston engineering firms have contracts for ordnance plants in excess of $33 million.

Seattle — While projects involving structurals are of minor importance shops are busy on subcontracts for shipyards and fabricating equipment for the armed forces. Pacific Car & Foundry Co. is constructing wing spars for Boeing planes, parts of flight decks for escort-type aircraft carriers, steel barges, armor-plate castings for tanks, tank recovery trucks, winches, heavy forgings, gears, precision machine specialties and other items.

Chicago — With structural shapes tight, WPB is using directives freely to insert tonnage for urgent projects into mill schedules. This necessitates frequent revisions in schedules. Deliveries of standard shapes now are in May and June, a push-back of about 30 days. Smaller fabricators are fairly well booked with small buildings and minor additions. However, they are obliged to obtain most of their material from warehouses to meet specified deliveries. Larger jobs are of necessity met by directives.

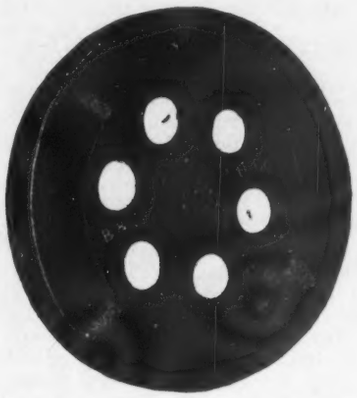
New York — December bookings of fabricated structural steel for bridge and building construction reported to the American Institute of Steel Construction totaled 37,004 tons, compared with 62,437 tons in November and 35,482 tons in December, 1943. Shipments in December were 61,273 tons, compared with 59,273 tons in November and 39,633 tons in December, 1943. Tonnage available for fabrication within the next four months was 142,530 tons, as of Dec. 31, 1944.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 169

Pittsburgh — Quotas are still being cut on new billet steel, although bessemer capacity is idle in this district, which could be utilized. New domestic jobs are relatively light, virtually all for Army and Navy. Tonnage going to rail mills is fairly heavy in relationship to the available supply of rails. Attempts to supply rail mills with bessemer billets have met with considerable resistance, particularly since stocks of new billet bars held by fabricators are diminishing with little chance of replacement from the small quotas of the new billet mills and none from the rail mills, who do their own fabricating.

Chicago — Inquiry for reinforcing steel is shrinking and even after some jobs are bid the question arises as to whether priorities can be obtained. Small jobs, involving expansion and repair, overshadow large ones. Outlook is that needs in the months ahead will have to be met principally by rerolled rail, as new billet steel is diverted to war use.



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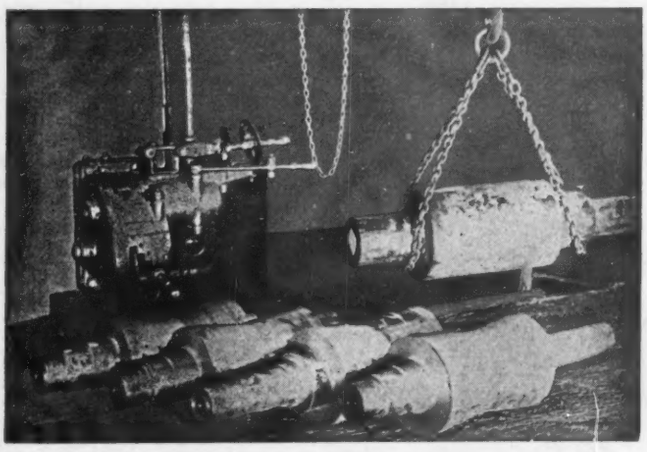

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Midwestern rail steel mills booked a small part of the 17,000 tons of concrete bars which the Treasury Department placed under lend-lease for rehabilitation in France. Specified for February and March delivery, a considerable part will come from stocks.

Pig Iron . . .

Pig Iron Prices, Page 171

Continued delay in railroad movement of pig iron causes a current shortage, though the condition is improving. New England and seaboard melters dependent in large measure on Buffalo furnaces are receiving little material and considerable borrowing has been done. This now has reached a limit. In the former area iron has been taken from the reserves at the Everett furnace. Considerable foundry curtailment has been necessary.

New York — Continued delay in the shipment of iron from Buffalo where at least three furnaces are banked and others are operating below capacity, due to weather conditions, is being reflected in a further decline in foundry melt here. The situation is somewhat more promising, but tonnage so far is not being received in sufficient volume to offset the decline in stocks at consumer plants.

Various foundries still have supplies, with a number having enough to tide them over the present emergency if not too long. But some have had to follow the action of others in curtailing their melt and some foundries which have already curtailed are cutting production still more. In few cases, however, have top priority casting contracts been affected, due to action taken by Washington in seeing that these essential plants got sufficient iron by one measure or another.

Boston — With deliveries lagging, pig iron supplies are not being materially replenished by delayed shipments from Buffalo; considerable iron due last month has not been delivered. Meanwhile emergency withdrawals from Everett reserves and loans from nearby foundries are keeping some shops going. In some cases consumers have loaned all the iron possible if they are to maintain their own operations. Transportation delay at Buffalo comes at a time when more iron than usual is scheduled from that area; some is coming from as far as Lorain, O. Indicating the trend, partially due to the husbanding of district furnace reserves, sales by an integrated producer at Buffalo have more than doubled in New England territory.

Buffalo — While the railroad situation has improved, pig iron producers say preference is being given to coal and coke, with iron still being piled at furnaces and considerable delay for iron already shipped. Costs are rising as piled iron causes additional handling. In addition to stocks on the ground loaded cars congest furnace yards, causing a problem as to where iron can be stored. New England and seaboard melters are urging better delivery to avoid shutdowns. Some truck deliveries are being made in a radius of 200 to 250 miles.

Cleveland — A number of foundries are critically short of foundry and heating coke, which, combined with the industrial gas shortage have adversely affected operations. One was forced to shut down temporarily, due to lack of pig iron. However, foundry pig iron stocks are adequate in most instances although unbalanced. Jobbing foundries, with their diverse line of products, use as much as six different analyses of pig iron. In many instances they are having difficulty getting desired analysis. Pig iron producers are in effect rationing iron to the merchant trade through cutting back customers' contracts to conform with actual requirements.

Cincinnati—Stocks of foundry iron are low, but the lag in deliveries of northern iron has not yet brought critical shortages. Shipments of southern iron have been more regular during the transportation crisis. Specifications are virtually unchanged, and unaffected by the limit of 30-days supply. Few melters are carrying more than this maximum.

Philadelphia — Situation in basic pig iron is acute notwithstanding the fact that operations are tapering, from lack of fuel. Some open hearths are scheduled to go off in a few days unless pig iron shipments arrive. To consumers in better position expected clarification of the recent 30-day inventory regulation will be of more immediate interest.

Chicago — Recent embargoes on rail shipments had little effect on pig iron in this area. Chicago was just outside the embargo zone and shipments to the East were readily diverted during the restricted periods to points west, north and south. Some consumers are forced to defer shipment in order to reduce inventory to the new 30-day limit. Continued manpower shortage still restricts foundry melts. Of the district's 41 blast furnaces, 40 are operating, the best rate since January, 1944, when all of the 40 stacks then existing were in blast. Carnegie-Illinois Steel Corp. on Feb. 8 relighted its Gary No. 11 stack which went out Oct. 22 for relining.

Pittsburgh — Although there have been no reports of shutdowns due to lack of pig iron, a good many customers are operating closer to the belt than the 30-day maximum inventory now permissible. Shipping situation has been particularly bad in this area, and many cars of pig have wound up in the freight yards instead of the stockpile. Added to that, the embargo has prevented shipment of additional material although it has not caused reduction in iron production at any merchant stacks. Some tonnage loss was reported by U. S. Steel Corp. subsidiaries last week, due to reduction of air on some stacks which supply hot metal and pig iron to open hearths which were down because of the fuel shortage.

Scrap . . .

Scrap Prices, Page 172

Scrap is fairly quiet with movement somewhat better as the snow blockade is relieved. Prices continue at ceilings, except in borings and turnings, which show weakness. Industrial scrap has piled up at producers' plants during the transportation lull and will come out soon to meet needs.

Pittsburgh — In all probability the weather has succeeded in liquidating the scrap shortage it created here. Tonnage lost by open hearths out of production due to weather, the freight situation and fuel shortages probably offset the reduction in scrap shipments and

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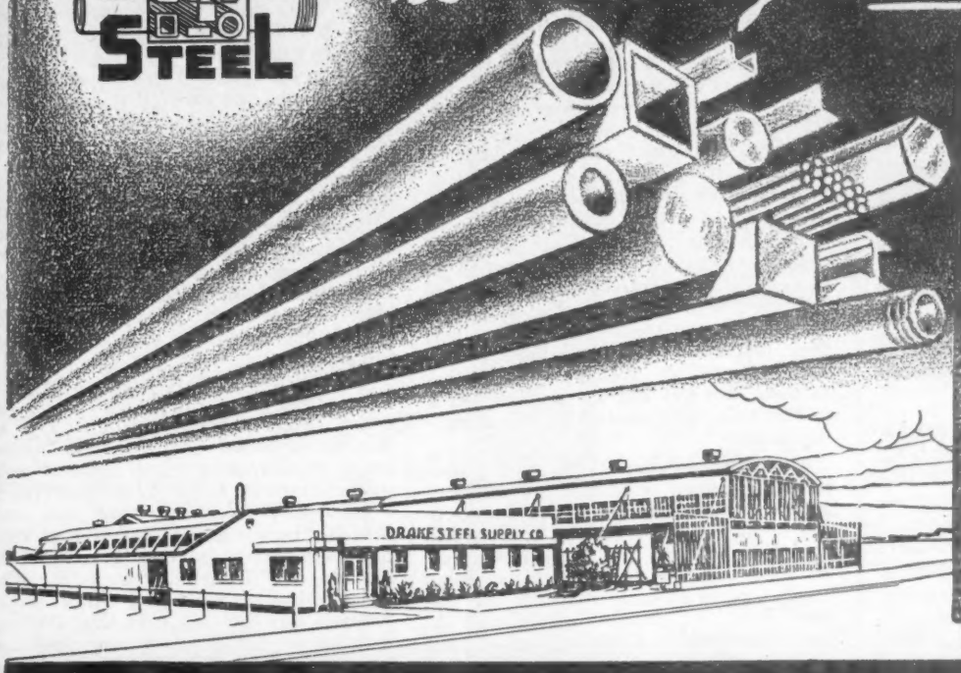

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averted what otherwise would have been a serious shortage. Shipments of scrap into consumption here in the past 60 days have probably been as low as any similar period since the beginning of the war, with the possible exception of last August and September during the market break. Yard activity, already cut down by manpower shortages, has been virtually nil because of car shortages, the freight embargo, and bad weather. Industrial scrap is piling up at the point of production, but no tonnage will be lost in the last analysis; there will be only a lag in deliveries.

Philadelphia — Both consumers and sellers of scrap are centering attention on movement of material against existing contracts, with buying secondary. Steelmakers report stocks low and melters have practically given up efforts to obtain cast grades. Weakness in turnings in some districts has not been reflected in this area, with quotations still at ceiling levels.

Cleveland — The WPB zoning plan for scrap, aimed at curtailing cross hauling, is reported to be shelved, due to the opposition expressed by dealers and brokers who state that the plan disrupted long standing trade contacts. Scrap trade expects an early return to the former OPA $1 freight springboard as an alternative. Electric furnace and open-hearth scrap continues scarce, and will continue so until weather conditions ease materially. Further weakness in turnings developed last week, with the range here now at $12 to $13 per ton on machine shop turnings and $10 to $11 on short shoveling and mixed borings.

Chicago — Weakness in turnings and borings continues to mark scrap trend here. Prices have sagged $1 to $1.50 to a nominal basis in absence of consumer buying. Major grades continue at ceiling level but the $9.50 to $10 price on machine shop turnings is expected to be reflected shortly in the price of No. 2 turnings bundles. Mills are buying scrap cautiously and only in keeping with current needs. Yard operations and car shipments are generally retarded by snow and rail congestion.

Buffalo — Ceiling prices continue, though both buyers and sellers are wary of results of European war successes. Mills are restricting buying periods and dealers are reluctant to build up yard stocks beyond orders on books. Shipments are back practically to normal. With no protection against order cancellations dealers are not heeding WPB request to accumulate large stocks and they are being reduced in nearly all instances.

Detroit — No further weakness has developed in borings and turnings after the 50-cent decline in dealers' buying prices a week ago. Other grades hold at ceiling levels, although a sentimental weakness is developing in electric furnace material. No reports of sales below ceiling price are heard, however. Weather in the past two weeks has not been too severe, but yards are hampered by continued absenteeism and low quality of labor available. Recent four-day week-end freight embargo held up shipments from out of the state and freight consigned outstate, but the statewide switching area was exempted. Great Lakes Steel Corp. for the first time in 18 months or more has returned to the scrap market, buying a few selected tonnages of open-hearth material. Scrap stocks are ample, and current buying is more or less in furtherance of WPB suggestions that mills keep fully stocked. Material now being bought is inspected carefully, and comprises principally heavy melting and black bundles, with bundles containing turnings excluded.

Boston—Shortage of foundry cast scrap has not eased, emphasized at some shops by low pig iron inventories. Shipments of steelmaking grades to Pennsylvania have been restricted, but heavier tonnage available to district mills is limited by retarded yard operations. Steelworks seek tonnage to bolster reserves, in one case down to 30 days. There are also allocations of government-owned scrap. Production of light scrap tends upward with the ratio of alloys maintained, slightly higher in the case of solids at forge plants.

Los Angeles—Scrap is quiet, with a slight tendency toward higher prices, which continue below ceilings. This is due to increased war demand. Shipments of shipyard scrap to midwest consumers continue, under WPB allocations.

Cincinnati—Flow of scrap iron and steel has been curtailed by reduced railroad lists, failure of country scrap collecting, and labor handicaps but the situation has not reached a critical stage. Reserves are proving adequate for the near view. Good heavy low phos has come into demand, with rails and good cast. Borings and turnings are so easy that dealers have lowered quotations $1.

St. Louis—Scrap supply is tightening progressively as a result of cold, hampering collection, and labor shortage. Yards find the latter condition worse. Mill reserves are shrinking as receipts are less than consumption.

Seattle—Scrap is sufficient for local needs and buying is about equal to consumption, inventories not being increased. Scrap from Kaiser shipyards in the Portland area is being shipped east on land-grant freight rates. Prices are unchanged at ceilings. A new feature is appearance of Canadian steel scrap in this market, shipped from Vancouver, B. C., under license and permit, shippers absorbing $2.50 freight. This scrap formerly went east, mainly to Algoma Steel Co.

Warehouse . . .

Warehouse Prices, Page 170

New York — Warehouse sales are heavy, covering a broad range, but inventories are more unbalanced, due to lengthening mill deliveries and transportation delays; car lots shipped by mills four or five weeks ago are still undelivered. Demand for alloys has upsurged. Among hot-rolled general line products, plates are inclined to lag. Wire products, including nails, have become among the most extended at mills for distributors.

Cleveland — Extended mill deliveries continue to force reliance on warehouse stocks. Warehouse inventories have declined moderately, reflecting increased demand and delays on mill shipments of orders placed late last year. Manpower continues a major problem, with shipment on items requiring flame cutting and shearing operations delayed as much as two weeks in a few instances. Inadequate trucking facilities also retards prompt shipment.

Chicago — Warehouses report no increase in buying in anticipation of possible higher prices. Buying volume is heavier, but results from the desire of

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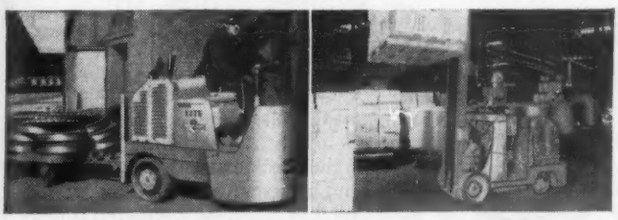

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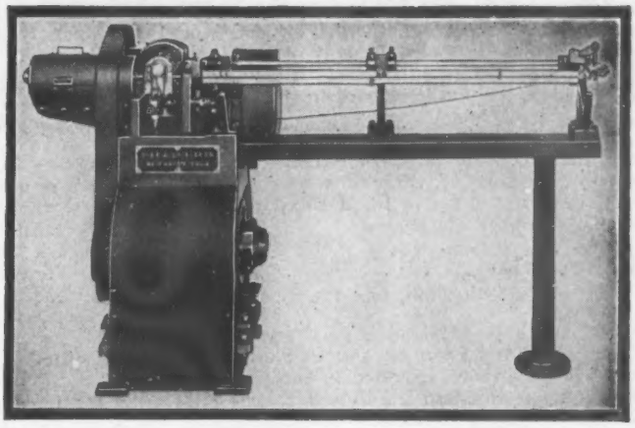

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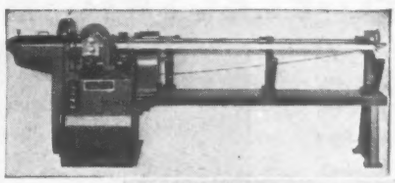
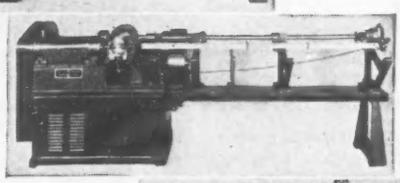
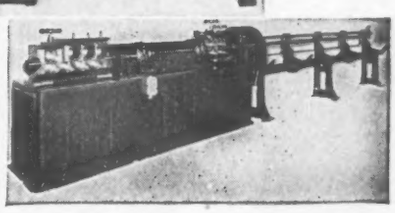


Type 1A
1/16"—3/16"
Dia.



Type 2A
1/8"—1/4"
Dia.

Type 3A
3/16"—3/8" Dia.
Type 4A (not shown)
3/8"—5/8" Dia.



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customers to obtain necessary materials to meet delivery schedules for urgent war goods. Sheet situation is critical, with galvanized stocks virtually nonexistent. Distributors are running a week to 10 days behind on work requiring shearing; and as much as two to three weeks on some special work. Reports are that because of the critical steel supply situation in general, warehouse load directives are due for a sharp cut soon.

Refractories . . .

Refractories Prices, Page 171

Pittsburgh — Demand is good for all types of refractory brick and deliveries have become more extended in the past 60 days. A lull last fall caused a general lowering of refractory inventories, which are now being built up. Problems in the brick plants have cut operations below the peak levels of last year. Prices generally are on the new levels following the 3 per cent increase permitted by OPA. Magnesite and basic brick remain unaffected, while other quotations have been increased.

Metallurgical Coke . . .

Coke Prices, Page 169

Chicago — Recent freight embargoes operated against foundries which have short supplies of coke and customarily obtain their fuel from central Indiana cokemakers. Inventories usually are not large because of restricted storage space and delay in shipments is a matter of consequence. Contributing also to hardship is the fact that adequate cars of the proper type are not available when needed.

Ferroalloys . . .

Ferroalloy Prices, Page 171

New York — Ferroalloy buying has taken a sharp spurt since the first of the year and with further heavy contracting in sight, sellers expect the current quarter to top the peak three-month period in 1944, which was the third quarter. This activity reflects heavy buying in steel and definite indications of a higher production rate in steel as soon as weather and labor conditions permit. Shipments also have increased since Jan. 1, although held down by traffic congestion.

Steel in Europe . . .

London — (*By Radio*) — Sheet mills in Great Britain are assured of full production for several months, especially in lighter gages, for which demand is excessive. Heavy plates are in less demand as war needs change. Steel rails are in active demand to meet railway needs. Quiet prevails in the market for heavy structurals. The situation is improving in the tin plate market.

Canada . . .

Toronto, Ont.—With Canadian steel mills almost fully booked on production for first half buying is steady but involves no large tonnages. Announcements have been made from government sources that permits have been granted for large increase in civilian manufacturing activities this year but these depend on equipment and labor supply with regard to their fulfillment. With upwards of 75 per cent of Canadian steel output now going into direct war channels, it is believed that the end of fighting will drop this rate to less than 35 per cent.

Both carbon and alloy bars continue in strong demand with about 80 per cent of new placements over the past week or ten days directly associated with war production. Rolling stock builders and implement makers are placing some new business but they are already well covered on contracts placed some time ago, while for other civilian purposes there has been some slowing in demand lately owing to the fact that orders are taken on an if-and-when delivery basis.

While there was a sharp drop in production of iron and steel in Canada in December, total production for the full year 1944 was the second highest in history, exceeded only by that for 1942. In December pig iron output at 139,152 net tons showed an average rate of 60.2 per cent against the year's average of 66.8 per cent while steel production at 243,482 net tons was 81.3 per cent in December and 84.2 per cent for the full year. The following table shows comparative production figures in net tons:

	Steel ingots, castings	Pig iron	Ferro-alloys
Dec. 1944	243,482	139,152	12,391
Nov. 1944	268,923	146,972	15,280
Dec. 1943	227,822	137,256	17,038
Year 1944	3,024,410	1,852,628	182,428
Year 1943	2,996,978	1,758,265	218,687
Year 1942	3,121,361	1,975,015	213,636
Year 1941	2,701,313	1,528,053	213,219

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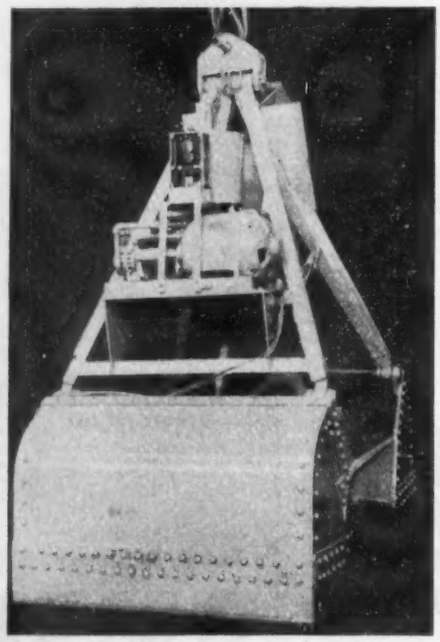

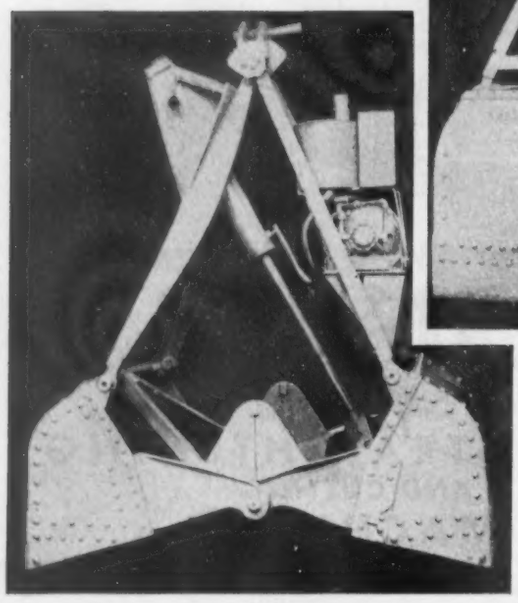

VICTOR R. BROWNING COMPANY, INC.
WILLOUGHBY, O.
★

U. S. Steel Wants To Acquire Geneva Works

(*Concluded from Page* 65)

company then had and now continues to maintain a fully integrated steel operation west of the Rockies, with coal and iron mines and a blast furnace and by-product coke ovens in Utah, and steel producing and finishing facilities near San Francisco and Los Angeles. During the past few years, Columbia's steel finishing facilities in California have been substantially extended and modernized by the expenditure of large sums of money.

Columbia Steel Co., has plans for further enlargements and modernization of its facilities to keep pace with the industrial growth and development of the Pacific Coast area. Undoubtedly the acquisition of the government's steel mill at Geneva upon some mutually satisfactory basis and the installation of any required additional finishing facilities could be made to fit in with this postwar program, without causing the abandonment or curtailment of Columbia's existing modern facilities in California."

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2700 tons, trestle caps and stringers, for Texas, for Atchison, Topeka & Santa Fe railroad, to Joseph T. Ryerson & Son Inc., Chicago; bids Jan. 23.

1400 tons, government shell plant at Lowell, Mass., to be operated by United Shoe Ma-

. . . all types and forms; any material, any quantity—made to your specifications, including heat-treating, spot welding, and tapped assemblies.

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Send in your specifications or prints for quotations or ask for suggestions on Parts Like These for application to your products.

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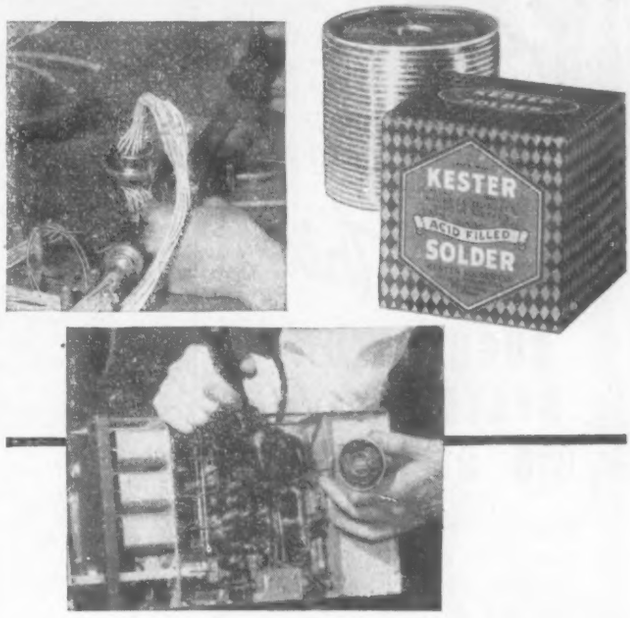

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● **Kester Rosin-Core Solder** contains patented flux that will not disintegrate, nor lose its fluxing power no matter what the temperature. It will not cause corrosion, nor injure insulation. It forms electrical connections that last as long as the apparatus—connections that resist shock, vibration, expansion and contraction.

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● Kester engineers offer 46 years soldering experience to help you. They will gladly work with you on any soldering problem.

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chinery Co.; placed through J. M. Fitzgerald, Boston, general contractor.

238 tons, eighteen 32-foot beam spans, bridge 126-A, Chillicothe, Ill., for Atchison, Topeka & Santa Fe railroad, to Joseph T. Ryerson & Son Inc., Chicago; bids Jan. 23.

200 tons, sheet piling, dock, Central Cold Storage Co., Chicago, to Carnegie-Illinois Steel Corp., Chicago; Fitz Simons & Connell Dredge & Dock Co., Chicago, contractor.

200 tons, sheet piling, also 60 tons beams, dock, for A. M. Castle & Co., Chicago, to Carnegie-Illinois Steel Corp., Chicago; Fitz Simons & Connell Dredge & Dock Co., Chicago, contractor.

200 tons, plant addition for Lee Tire & Rubber Co., Spring Mill, Pa., to Bethlehem Fabricators, Bethlehem, Pa.

150 tons, potato chip plant for Wise Delicatessen Co., Berwick, Pa., to Anthracite Bridge Co., Scranton, Pa.

STRUCTURAL STEEL PENDING

1031 tons, beam bridge, Braden, Okla., for state highway commission.

550 tons, mill building, Opelika Mills, Opelika, Ala.

500 tons, beam bridge, Wyandotte, Okla., for state highway commission.

330 tons, naval test station, Chincotague, Va.; bids Feb. 8.

200 tons, crane runway, Hercules Powder Co., Hattiesburg, Miss.

130 tons, alterations, Hotel Majestic, Philadelphia; bids asked.

115 tons, provision plant, Wyoming, Del.; bids asked.

PLATES . . .

PLATES PLACED

100 tons or more, two 100,000-gallon water storage tanks, naval air depot, Crane, Ind., to Pittsburgh-Des Moines Steel Co., Chicago, $41,060.

PLATES PENDING

300 tons or more, 3660 feet 30 to 58-inch water supply line; bids to Tacoma, Wash., Feb. 14.

Unstated, water system improvement, Eugene, Oreg.; Steel Pipe & Tank Co., Portland, Oreg., low.

REINFORCING BARS . . .

REINFORCING BARS PLACED

750 tons, additional fuel oil facilities, Norfolk Navy Base, Norfolk, Va., to Bethlehem Steel Corp., through Hall-Hodges Inc.

350 tons, U. S. Rubber plant, Detroit, superstructure tonnage to Truscon Steel Co., through O. W. Burke, contractor.

125 tons, Central Kansas Cooperative Association, Great Bend, Kans., George L. Christopher, contractor, to Colorado Fuel & Iron Co.

130 tons, nurses home, Billings, Mont., to Bethlehem Steel Co., Bethlehem, Pa.; J. C. Boespflug, Miles Center, Mont., contractor; bids Jan. 15.

118 tons, veterans' hospital, Dwight, Ill., for U. S. Veterans' Administration, to Ceco Steel Products Corp., New York; J. D. Hedin Construction Co., Washington, contractor; bids Jan. 16.

100 tons, warehouse, Drewry's Ltd., South Bend, Ind., to Ceco Steel Products Corp., Chicago; Sollitt Construction Co., South Bend, Ind., contractor.

REINFORCING BARS PENDING

600 tons, Wagner Electric Co. addition, Wellston, Mo.

300 tons, Atlas Powder Ordnance Plant, Weldon Springs, Mo.

120 tons, water treatment plant, Rock Island arsenal, Rock Island, Ill.; bids Feb. 7.

100 tons, additional magazines, proving ground, Dahlgren, Va.

PIPE . . .

CAST IRON PIPE PENDING

210 tons, 4 and 6-inch stock replacements for Seattle; bids Feb. 9.

100 tons, District 49, Seattle; bids in.

100 tons, two local improvements, Seattle; bids in.

RAILS, CARS . . .

RAILROAD CARS PLACED

Export, 500 air dump cars, to Magor Car Corp., Passaic, N. J.

Fruit Growers Express Co., 300 refrigerator cars, to Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill.; for fourth quarter delivery.

Illinois Terminal railroad, 50 fifty-ton Victory model steel flat cars, to St. Louis plant of American Car & Foundry Co., New York.

RAILS PENDING

400 tons, 90-pound steel rail, Tacoma, Wash., belt line, also 21 sets of switches; bids Feb. 14.

LOCOMOTIVES PLACED

Chesapeake & Ohio, 10 mikado-type locomotives, to Lima Locomotive Works, Lima, O.

French Provisional Government, 200 2-8-2 locomotives; 180 to Lima Locomotive Works, Lima, O.; ten each to American Locomotive Co., New York, and Baldwin Locomotive Works, Eddystone, Pa.; in addition to 500 recently divided between the latter two builders.

New York Central, 25 steam locomotives, to American Locomotive Co., New York.

Russia, 500 2-10-0 locomotives; divided equally between American Locomotive Co., New York, and Baldwin Locomotive Works, Eddystone, Pa.

CONSTRUCTION AND ENTERPRISE

OHIO

ALLIANCE, O.—Morgan Engineering Co., Oxford street, will replace two boilers at cost of $75,000.

CLEVELAND—Howes Iron Works Co., Clifford Howe, president, has been incorporated with $5000 capital and 250 shares no par value, to operate a fabricating plant at 4856 Henry street.

CLEVELAND—Aluminum Co. of America, 2210 Harvard avenue, has received WPB approval for alterations to building and installation of furnace and handling equipment for processing scrap aluminum, to cost about $350,000, expiring July 31, 1945.

DAYTON, O.—Dayton Malleable Iron Co. has been given WPB approval for a two-story addition for machine and carpenter shop, etc., costing $131,000, expiring May 15, 1945.

GENEVA, O.—Geneva Metal Wheel Co., H. A. Carter, president, is having plans prepared by C. V. Martin, 222 Center street, for a one-story 25 x 200-foot plant addition, costing about $40,000.

HILLSBORO, O.—C. S. Bell Co. plans erection of five foundry plant buildings on U. S. Route 50, one mile west of Hillsboro.

LORAIN, O.—National Tube Co., Pittsburgh, has received WPB approval for installation of three by-product coke oven batteries and auxiliaries, rotary car dumper, conveyor system and coal preparation facilities, at plant here, to cost over $15 million, expiring Dec. 31, 1945.

OWEN
Scrap
GRAPPLES

THE OWEN BUCKET COMPANY
BREAKWATER AVE. • CLEVELAND, OHIO
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.

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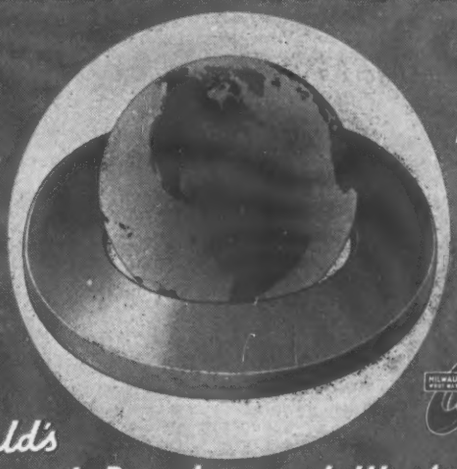
MILWAUKEE WROUGHT WASHERS
encircle the Globe!



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THE OHIO GALVANIZING & MFG. CO.
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VOLZ PLATE-LIFTING CLAMPS
Now Give You More
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- QUICK RELEASE!
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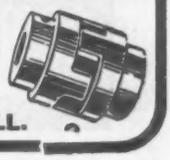

LOVEJOY FLEXIBLE COUPLING CO., 5071 W. Lake St., CHICAGO 44, ILL.

MASSILLON, O.—Eaton Mfg. Co., Reliance Division, care C. F. Ochs, president, 739 East 149th street, Cleveland, will build a warehouse, 1½ stories, 60 x 120 feet, to cost about $32,000.

NEWARK, O.—Pharis Tire & Rubber Co. has received WPB approval for construction of a truck tire plant and installation of processing facilities and equipment, to cost about $2 million, expiring Sept. 1, 1945.

SANDUSKY, O.—Cunningham-Rudy Co. has been given a permit for a machine shop and warehouse addition.

TOLEDO, O.—Doehler-Jarvis Co., Smead avenue, plans a one-story and a three-story plant building adjoining present plant, to cost about $600,000.

CONNECTICUT

BRIDGEPORT, CONN.—Bridgeport Brass Co., 30 Grand street, will build factory addition at East Main and Walter streets, to cost about $40,000. Fletcher Thompson Inc., 211 State street, is engineer.

STAMFORD, CONN.—Globe Slicing Machine Co., 224 Selleck street, plans a brick factory. L. F. Caproni, 1221 Chapel street, New Haven, Conn., is engineer.

NEW HAMPSHIRE

ROCHESTER, N. H.—City plans sewage disposal plant and water system extensions, to cost about $363,000, for postwar construction.

RHODE ISLAND

CRANSTON, R. I.—Atlantic Tubing & Rubber Co. has let contract to J. Donatelli, 152 Cottage avenue, for a factory building estimated to cost about $45,000.

NEW JERSEY

CLIFTON, N. J.—V. Mazzarisi Co. Inc., 619 Lexington avenue, has plans by J. Thomas Camlet, 24 Plaget avenue, for a one-story machine shop and warehouse addition, to cost about $60,000.

PATERSON, N. J.—Bogue Electric Co., 37 Kentucky avenue, will build a three-story 65 x 200-foot manufacturing building by separate contracts, estimated to cost $35,000.

PENNSYLVANIA

MORRISVILLE, PA.—Department of public works, Boro Hall, plans sewage disposal plant. Albright & Friel Inc., 1520 Locust street, Philadelphia, are engineers.

OIL CITY, PA.—Pennzoil Co. has received WPB approval for installation of two diesel-driven generator sets at plant No. 2 boiler-house as standby equipment, to cost $19,720, expiring June 1, 1945.

PITTSBURGH—Jones & Laughlin Steel Corp., W. A. Morris, purchasing agent, Third and Ross streets, has let contract to Rust Engineering Co., Clark building, for a shell plant with six open crane runways up to 250 feet long and 65 feet wide, induction and electric furnaces, process piping, etc., to cost about $1 million. C. W. Littler, care owner, is engineer.

YOUNGWOOD, PA.—Robertshaw Thermostat Co. has been given WPB approval for extension of plant and installation of machinery for manufacture of boosters, costing $281,663, expiring April 30, 1945.

MICHIGAN

BAY CITY, MICH.—Resistance Welder Corp., 402 Phoenix building, has been incorporated with $200,000 capital to manufacture machinery and equipment, by Clyde F. Kaunitz, 2300 Groveland street, Bay City.

DETROIT—General Magnetic Corp., 2128 East Fort street, has let general contract to L. E. Kuhlman, 16206 East Warren street, for erection of a $75,000 plant.

DETROIT—Energy Inc., 6916 Donald place, has been incorporated with $10,000 capital for engineering, development, manufacturing and sales, by I. E. Goodman, 3515 Sherborne street.

DETROIT—Winter Bros. Stamping Co., 7351 Lyndon street, has let contract to Campbell Construction Co., 3255 Goldner street for an addition to its plant.

DETROIT—American Smelting & Refining Co., Federated Metals Division, 11630 Russel street, has let contract for a dross room addition to William C. Peters Co., Detroit, and for a chlorine rack house to Sugarman & Moore, Chicago.

HAMTRAMCK, MICH.—Champion Spark Plug Co., 620 Fisher building, Detroit, has let contract to Barton-Malow Co., 2631 Woodward avenue, Detroit, for construction of fan houses No. 13 and 56, in Hamtramck.

HIGHLAND PARK, MICH.—Todd Steel Corp., 15843 Second boulevard, has let contract for a plant addition to O. W. Burke Co., 1101 Fisher building, for a plant addition.

ILLINOIS

CHICAGO—Illinois Gage Co., 7810 Addison street, has plans by S. Klefstad, 3600 West Fullerton avenue, for a one-story 100 x 150-foot plant.

INDIANA

LEBANON, IND.—Honan Crane Corp., Lebanon, and 250 Delaware avenue, Buffalo, has plans by G. M. Wolfe, 1377 Main street, Buffalo, for a two-story brick factory and office building to cost about $100,000.

MUNCIE, IND.—Magic City Foundries plans erection of a new foundry plant at Ohio avenue and C. & O. railway, 100 x 200 feet main building, to cost over $40,000, with equipment.

ALABAMA

BIRMINGHAM, ALA.—Alabama Metal Lath Co., 1631 Vanderbilt road, has let contract to J. F. Holley Construction Co., 905 Sixth avenue, for a plant addition costing $98,450. Charles H. McCauley, Jackson building, is architect.

TENNESSEE

CHATTANOOGA, TENN.—Mascot Stove Co. has bought site at Chestnut street and Twenty-fifth avenue where it will build a plant costing about $300,000 after the war.

MEMPHIS, TENN.—Buckeye Cotton Oil Co., Chemical Pulp Division, W. F. Bowld, vice president, will operate a government-owned chemical pulp plant to be erected near its present plant on Jackson street. H. K. Ferguson Co., Cleveland, will build the plant at cost of $2,200.000.

NASHVILLE, TENN.—Goodyear Tire & Rubber Co., Akron, O., has let contract to Foster-Creighton Co., American National Bank building, for erection of a $10 million plant, for manufacture of large military truck tires, one story, about 400 x 1000 feet.

PULASKI, TENN.—Marshall Stove Co., W. M. Weaver, general manager, Lewisburg, Tenn., will take bids soon for a one-story stove factory 90 x 180 feet. Clarence Dykes, Lewisburg, is architect.

VIRGINIA

HOPEWELL, VA. — Atmospheric Nitrogen Corp. has been given WPB approval for completion of third train for production of anhydrous ammonia and installation of equipment, including turbo blowers, washing towers and pumps, at South Point, O., to cost $3,400,000, expiring Nov. 30, 1945.

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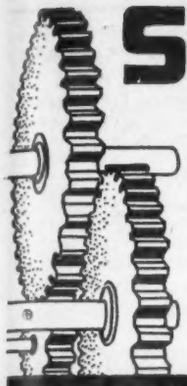

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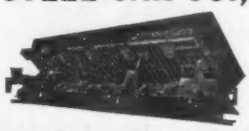

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MISSOURI

ST. LOUIS—Air Conditioning Inc., 2112 Locust street has been incorporated with $30,000 capital by William Kagan, University City, Mo., to build refrigerating equipment.

OKLAHOMA

OKLAHOMA CITY, OKLA.—Black, Sivalls & Bryson Inc., 2131 Westwood street, manufacturer of boiler heads, towers and pressure vessels, plans a one-story plant addition costing about $60,000.

WISCONSIN

ALGOMA, WIS.—Algoma Foundry & Machine Co. has plans by Foeller, Schober, Berners, Safford & Jahn, 310 Pine street, Green Bay, Wis., for a one-story 73 x 98-foot foundry addition.

WEST MILWAUKEE, WIS.—L. Burmeister Co., 3225 West Burnham street, has let contract to Selzer-Ornst Co., 6222 West State street, Wauwatosa 13, Wis., for a one-story 100 x 200-foot machine shop. George Schley & Sons, 2309 East Glendale avenue, is architect.

TEXAS

HOUSTON, TEX.—Production Service Co., 3382 Old Spanish Trail, will build shop addition at 3512 Dixie avenue. Harry A. Turner, 3619 Plumb street, Houston, is architect.

HOUSTON, TEX.—Kelly-Springfield Tire Co., Cumberland, Md., has let contract to Brown & Root Inc., Houston, for a tire plant to cost $6 million. J. Gordon Turnbull, Dallas, Tex., and 2630 Chester avenue, Cleveland, is engineer.

SOUTH DAKOTA

YANKTON, S. DAK.—Croll-Freeman Corp. is building a one-story plant 133 x 170 feet and two-story office building 22 x 90 feet, with overhead crane full length of factory building.

NEBRASKA

OMAHA, NEBR.—Central Mfg. Co., 1614 Izard avenue, formerly a partnership, has been incorporated with $50,000 capital to manufacture steel products, by E. M. Spieth and associates.

MONTANA

LAUREL, MONT.—Northern Pacific railway, B. Blum, chief engineer, 176 East Fifth street, St. Paul, will build a powerplant with engine room, ash hopper, trackage, piping and water-softening facilities, to cost about $400,000.

LAUREL, MONT.—WPB has approved Northern Pacific railroad's application for permission to erect a power plant costing $393,000, including boiler room and additional roundhouse and machine shop facilities.

CALIFORNIA

BURBANK, CALIF.—Lockheed Aircraft Corp. has a building permit for factory building No. 82A at 1705 Victory Place, to cost about $45,000. Ford J. Twaits Co., Los Angeles, has the contract.

EL SEGUNDO, CALIF.—Standard Oil Co. of California, Olympic building, Los Angeles, has let contract to Foster-Wheeler Co., 714 West Olympic boulevard, Los Angeles, for a 200-foot concrete stack and installation of two boilers at its refinery. Cost estimated at about $200,000.

LOS ANGELES—McCullough Tool Co. has let contract to Buttress & McClellan, 1013 East Eighth street, for a plant addition at Slauson and Alameda streets, to cost about $7000.

LOS ANGELES—Airplane Equipment Co. will build a shop structure at 2822 Benedict street, covering 2400 square feet, work by own forces.

ONTARIO, CALIF.—California Fruit Growers' Exchange directors have approved construction of a $400,000 plant for production of single strength orange juice, with capacity of about 2000 cars annually.

VAN NUYS, CALIF.—Bendix Aviation Inc. is building an addition to its plant at 11600 Sherman Way, 20 x 25 feet and 20 x 45 feet, to cost about $6000. Austin Co. has the contract.

VERNON, CALIF.—MacGlashan Air Machine Gun Co. will build a machine shop and office building at 4715 Hamton street, 75 x 110 feet, to cost about $20,000. William J. Morgan Co., 1011 South Fremont avenue, Alhambra, Calif., has the contract.

SAN DIEGO, CALIF.—Solar Aircraft Co. has a building permit for a hammer building at its plant at 1212 West Juniper street, 40 x 80 feet, to cost about $53,000. Trepte Construction Co., San Diego, has the contract.

OREGON

PORTLAND, OREG.—Shofner Iron & Steel Works, 2770 NW Yeon avenue, plans additions and alterations to its plant, to cost about $100,000.

WASHINGTON

SEATTLE—Central Metal Products Co. has been incorporated with $50,000 capital by Frank J. Seidelhuber and associates, 6916 Fifty-sixth avenue South.

SEATTLE—Pump Engineering Co. has been incorporated with $50,000 capital by Merrit C. Wemple and associates, 1331 Third Avenue building, to deal in pumps and pumping devices

TILLAMOOK, WASH. — Aberdeen Plywood Corp. has plans for a proposed $125,000 peeler mill here, for which bids will be asked soon. Acme Door Co., Hoquiam, Wash., also plans a plant here to use logs unsuited for plywood. Rudolph Anderson, Hoquiam, is designing engineer.

WALLA WALLA, WASH.—Continental Can Co. has let contract to the Austin Co., Seattle, for a concrete and brick warehouse addition, 140 x 300 feet, costing $100,000.

DPC Authorizes Plant Expansion, Equipment

Defense Plant Corp. has authorized the following expansions and equipment purchases (figures are approximate):

Kelley-Springfield Tire Co., Cumberland, Md., $6 million to provide plant facilities at Houston, Tex.

Consolidated Chemical Industries Inc., Houston, Tex., $90,000 to provide equipment at a plant in Houston.

Williams, White & Co., Moline, Ill., $40,000 increase in contract to provide additional equipment at a plant in Moline, making overall commitment $115,000.

Rheem Mfg. Co., Washington, $60,000 increase in contract to provide additional equipment at a plant in Stockton, Calif., making overall commitment $215,000.

Adirondack Foundries & Steel Inc., Watervliet, N. Y., $115,000 increase in contract to provide additional facilities at Watervliet, making overall commitment $1,830,000.

Fuller Mfg. Co., Kalamazoo, Mich., $250,000 increase in contract to provide additional equipment at a plant in Kalamazoo, making overall commitment $350,000.

Rheem Mfg. Co., New York, $3,000,000 to provide plant facilities at Houston, Tex., and $5,800,000 for facilities at Brooklyn, N. Y.

Republic Steel Corp., Cleveland, $135,000 increase in contract to provide additional equipment at a plant at Niles, O., making overall commitment $5,280,000.

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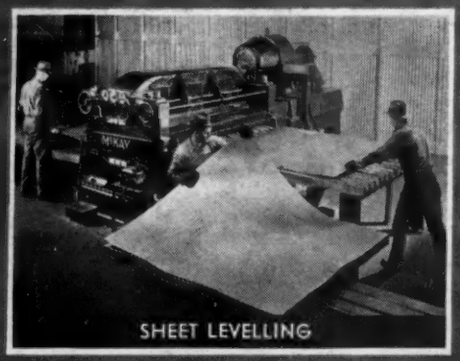

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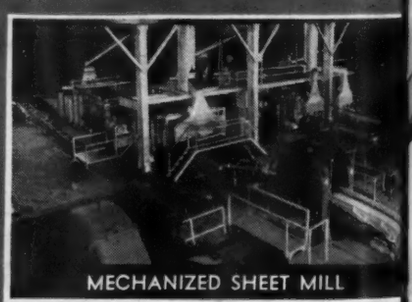

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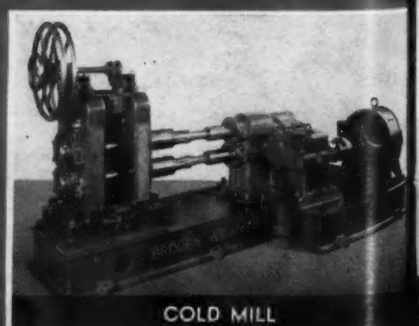

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